U.S. Department of the Interior
Bureau of Land Management

Prineville Field Office
3050 N.E. 3rd Street
Prineville, Oregon 97754

April 2003

Evironmental Assessment and Finding of No Significant Impacts for the Little Canyon Mountain Fuel Reduction Project

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

BLM/OR/WA/GI-03/018+1792

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Prineville Field Office
3050 N.E. 3rd Street
Prineville, Oregon 97754

IN REPLY REFER TO:
5800.2
EA#OR-054-02-083

APR 18 2003

Dear Interested Public:

Enclosed is a copy of the Environmental Assessment (EA) and Finding of No Significant Impacts (FONSI) for the Little Canyon Mountain Fuel Reduction Project, EA#OR-054-02-083. You have either specifically requested this EA for review or the proposed action is of a type or within an area for which you have shown interest.

We want to give you the opportunity to review and comment on the actions analyzed in this document. We will consider all timely comments and either incorporate them into the EA, or explain why we didn't. If you comment, you will be notified of the decision and have the opportunity to appeal the decision when it is made. Specific questions related to this EA and FONSI should be directed to Brent Ralston, project leader at (541) 416-6713.

The EA and FONSI will be made available for public review from April 25, 2003 to May 27, 2003. The notice for public comment will be published in a legal notice by the Central Oregonian and Blue Mountain Eagle, local newspapers of general circulation. The EA, FONSI, and appendices are available on the Internet at http://www.or.blm.gov/Prineville/LCM/home.htm. The documents are also available in hardcopy or on CD by request at the Prineville District Office. A public informational meeting will be held on April 29, 2003, at 6:00 p.m. in John Day, Oregon at the Senior Center - 142 NE Dayton Street - to describe the proposed project.

Please send your written comments to Dan Tippy at the above address. Comments received in the Central Oregon Resource Area Office, on or before May 27, 2003 at 4:30 P.M., Pacific Time, will be considered in making the final decisions for this project. Office hours are Monday through Friday, 7:45 A.M. to 4:30 P.M., closed on holidays.

Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours (7:45 a.m. to 4:15 p.m.), Monday through Friday, except holidays. Comments may be published as part of the EA or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address or both from public review, or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Sincerely,

Danny L. Tippy

Danny L. Tippy
Acting Field Manager, Central Oregon Field Office

FINDING OF NO SIGNIFICANT IMPACT

Little Canyon Mountain Fuel Reduction
Environmental Assessment (EA) No. OR 054-02-083
Prineville District Bureau of Land Management, Central Oregon Resource Area

A. INTRODUCTION

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number OR 054-02-083) for a proposal addressing fuels reduction of the Little Canyon Mountain Area (LCM) adjacent to Canyon City in Grant County. The primary focus and aim of the proposal is to address the following objectives:

1) **Hazardous Fuels Reduction**: Reduce hazardous fuels on LCM to manage surface fire and reduce crown fire potential in order to protect resources on the mountain and adjacent urban areas from catastrophic loss.

2) **Fire Prevention and Suppression**: Improve fire prevention and suppression opportunities on BLM managed lands within the project area.

3) **Forest Health**: Improve forest health by reducing stand densities and competition and stress among trees to promote healthier, more vigorous and robust tree stands which are more capable of resisting parasitic insect infestations and decrease the potential for continuous running crown fire.

The Little Canyon Mountain project area includes approximately 2,500 acres of BLM managed lands adjacent to Canyon City, 3 miles southeast of the city of John Day. The environmental assessment (EA) is attached to and incorporated by reference in this Finding of No Significant Impact (FONSI) determination. A No Action alternative was analyzed along with five action alternatives.

The proposal is in conformance with the John Day Resource Management Plan (RMP/EIS) and associated Record of Decision (USDI BLM, 1984 & 1985). All actions addressed are also consistent with guidance and direction that supercedes the 1984-85 RMP/EIS/ROD such as the Environmental Assessment for the interim strategies for managing anadromous fish producing watersheds in eastern Oregon and Washington, Idaho and portions of California (USDA FS and USDI BLM 1995) (PACFISH).

Treatment would occur through various vegetation management prescriptions, each addressed in the five described action alternatives. Other actions proposed in this process involve road access and maintenance, off-highway vehicle (OHV) use and illegal garbage dumping.

Chapter 2 of the EA fully describes the alternatives considered, elaborates on the issues raised during scoping and identifies potential impacts. Alternatives A (No Action) and B do not meet the purpose and need of the proposal and the potential for catastrophic fire would remain at an elevated level. Alternative A (No-Action) does not take any active management on the existing hazardous fuel levels and Alternative B treats only 225 acres with active management. Alternatives C, D, E, F, do meet the purpose and need of the proposal. Alternative D is marginally inconsistent with the RMP/EIS/ROD because it would create a greater degree of short-term change to visual resources than standards set in the RMP/EIS/ROD.

B. FINDING OF NO SIGNIFICANT IMPACT

Based upon review of the EA and supporting documents, I have determined that the project is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27 and do not exceed those effects described in the RMP/FEIS. Therefore, an environmental impact statement is not needed. This finding is based on the following discussion:

Context: The project is a site-specific action directly involving approximately 2,500 acres of BLM administered land that by itself does not have international, national, region-wide, or state-wide importance.

Intensity: The following discussion is organized around the Significance Criteria described in 40 CFR 1508.27.

1. Impacts may be both beneficial and adverse. The vegetative treatments described in the action alternatives would have varying degrees of impact to resources as described in Chapter 2 and 4 of the EA. Mitigations to reduce impacts to wildlife, fisheries, water quality, soils, air quality, visual resources, cultural and historic resources have been incorporated into the design of the action alternatives. None of the environmental effects discussed in detail in the EA and associated appendices are considered significant, nor do the effects exceed those described in the RMP/EIS/ROD.

2. The degree to which the selected alternative will affect public health or safety. The proposal is designed to reduce the risk of catastrophic wildfire to the mountain and the adjacent wildland urban interface area of Canyon City. This includes the objective to improve the opportunity to suppress wildfires and reduce the personal risk to firefighters. The action alternatives will reduce the public health and safety risks to varying degrees. Prescribed fire activities will be conducted in accordance with Oregon Department of Environmental Quality guidelines to minimize the risk of adverse effects on human health.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas. The historic and cultural resources of the areas have been inventoried and potential impacts mitigated in the design of the alternatives. There are no park lands, prime farm lands, wild and scenic rivers, or wildernesses located within the project area (EA, Appendix C).

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial. Extensive scoping of the project resulted in approximately eight comment letters and thirteen electronic comment messages. In addition, citizens of Canyon City, John Day, and Grant County held several open houses and field tours discussing the issues. BLM representatives attended these meetings as well as discussed and toured Little Canyon Mountain with various publics and agency personnel. In response to comments received from the Blue Mountain Biodiversity Project an alternative featuring a fuel break created up to but not exceeding 1000 feet inside the project boundary was developed (Alternative B).

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. The project is not unique or unusual. The BLM has implemented similar actions in similar areas. The environmental effects to the human environment are fully

analyzed in the EA. No predicted effects on the human environment are considered to be highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
The project does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration. The project is typical of previous actions and is consistent with established practices fully analyzed within the RMP/FEIS. Any future projects will be evaluated through the National Environmental Policy Act (NEPA) process and will stand on their own as to environmental effects.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. The interdisciplinary team evaluated the possible actions in context of past, present and reasonably foreseeable actions. No significant cumulative effects are predicted. A complete disclosure of the effects of the project is found in Chapter 4 of the EA.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources. The project will not adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor will it cause loss or destruction of significant scientific, cultural, or historical resources (EA, Appendix C).

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. Mitigations to reduce impacts to wildlife and fisheries have been incorporated into the design of the action alternatives. No listed fish species occupy habitat within the project boundary, but Mid-Columbia Steelhead do occupy habitat adjacent and immediately downstream within watersheds of the project boundary. Stream buffers are incorporated into the alternative designs to further reduce impacts to fisheries. No other threatened or endangered plants or animals were observed, reported or known to be present in the area.

ESA Consultation: Section 7 Consultation with the National Oceanic and Atmospheric Administration Fisheries Division for this proposed project is in progress.

10. Whether the action threatens a violation of a Federal, State, Local, or Tribal law, regulation or policy imposed for the protection of the environment, where non-Federal requirements are consistent with Federal requirements. The project does not violate any known Federal, State, Local or Tribal law or requirement imposed for the protection of the environment. State, local, and tribal interests were given the opportunity to participate in the environmental analysis process. Furthermore, the project is consistent with applicable land management plans, policies, and programs.

11. Comply with Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), or the Fish and Wildlife Coordination Act (water resource development projects only). There are no floodplains, wetlands or water resource projects involved in or adversely affected by this project.

12. Involve unresolved conflicts concerning alternative uses of available resources (NEPA section 102(2)(E)) not already decided in an approved land use plan. There are no unresolved conflicts not already approved in land use plans.

13. Have a disproportionate significant adverse impacts on low income or minority populations; Executive Order 12898 (Environmental Justice). This project does not have a disproportionate significant adverse impacts on low income or minority populations; Executive Order 12898 (Environmental Justice).

14. Restrict access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites; Executive Order 13007 (Indian Sacred Sites). Have significant adverse effect on Indian Trust Resources. This project does not restrict access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites; Executive Order 13007 (Indian Sacred Sites). This project does not have significant adverse effects on Indian Trust Resources.

15. Contribute to the introduction, existence, or spread of: Federally listed noxious weeds (Federal Noxious Weed Control Act); or invasive non-native species; Executive Order 13112 (Invasive Species). This project does not contribute to the introduction, existence, or spread of Federally listed noxious weeds or invasive non-native species.

16. Have a direct or indirect adverse impact on energy development, production, supply, and/or distribution; Executive Order 13212 (Actions to Expedite Energy-Related Projects). This project does not have a direct or indirect adverse impact on energy development, production, supply, and/or distribution.

Approved: Danny L. Tippy 3/26/03

Danny L. Tippy
Acting Field Manager
Central Oregon Resource Area

Date

Table of Contents

Chapter 3 - Existing Environment (Continued)

The following detached appendices are part of this Environmental Assessment, and are available from the Prineville District Office upon request, or may be downloaded from the following web site:

http://www.or.blm.gov/Prineville/LCM/home.htm

Appendix A - Summary of the 10-year Collaborative Strategy
The 11-Points as Described in the 11-Point Strategy
The Healthy Forests Initiative

Appendix B - League of Wilderness Defenders Draft Research Findings

Appendix C - Cultural Specialist Report

Appendix D - Fuels Specialist Report

Appendix E - Entomology Specialist Report

Appendix F - Silviculture Specialist Report

Appendix G - Visual Specialist Report

Appendix H - Engineering Specialist Report

Appendix I - Off-Highway Vehicles Specialist Report

Appendix J - Minerals Specialist Report

Appendix K - Range Management Specialist Report

Appendix L - Social and Economic Specialist Report

Appendix M - Wildlife Specialist Report

Appendix N - Fisheries Specialist Report

Appendix O - Botany Specialist Report

Appendix P - Hydrology Specialist Report

Appendix Q - Soils Specialist Report

Appendix R - Oregon Department of Fish and Wildlife

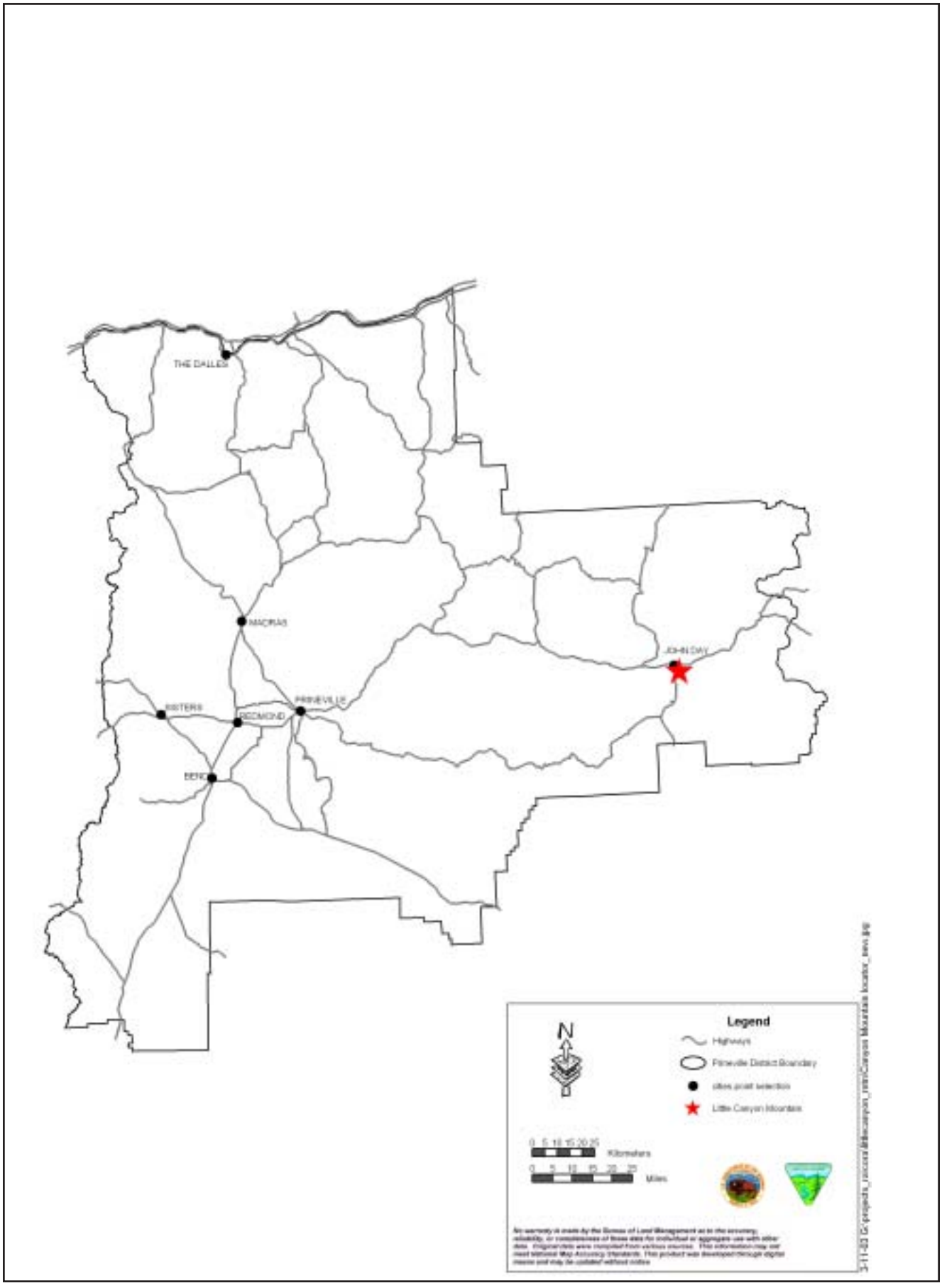
Appendix S - Oregon Department of Forestry

Little Canyon Mountain Fuels Reduction

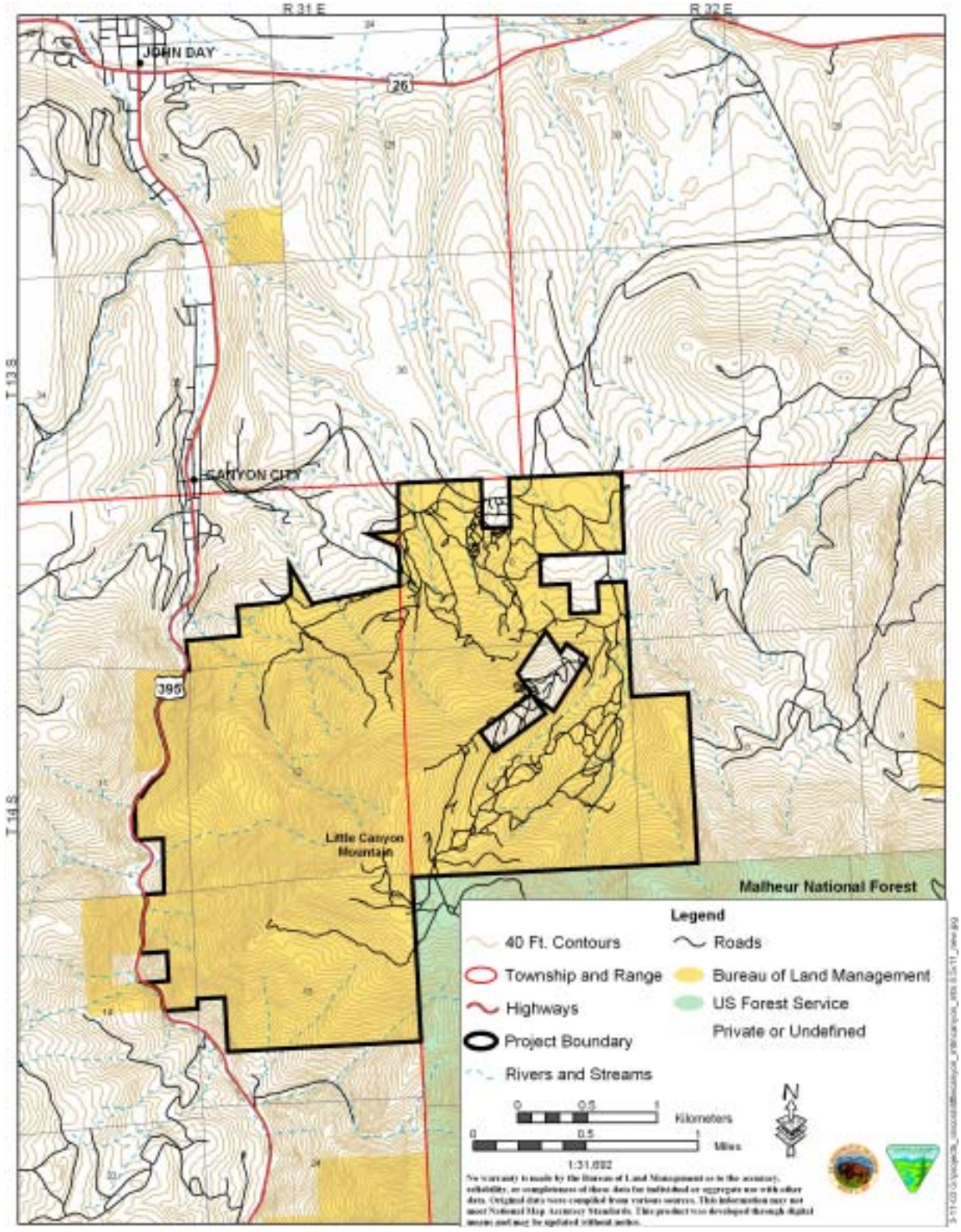
Environmental Assessment (EA) Number: OR054-02-083
Date of Preparation: April 2003
Preparing Office:
Prineville District Bureau of Land Managment (BLM)
Central Oregon Resource Area
Prineville, Oregon

Project Location: Located on Little Canyon Mountain, adjacent to Canyon City and approximately 3 miles southeast of the city of John Day. In Township 14 south, Range 31 east, Sections 7, 12 and 13, Willamette Meridian, Oregon.

Map 1. – General Project Location



Map 2. – Specific Project Area



Chapter 1
Purpose & Need

1.1 Introduction

This Environmental Assessment (EA) has been prepared for the Central Oregon Field Office's proposed Little Canyon Mountain (LCM) Fuels Reduction Project. This EA is a site-specific analysis of the potential impacts that could result from the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and making a determination as to whether any "significant" impacts could result from the analyzed actions. 'Significance' is defined by NEPA in regulation 40 CFR 1508.27 (See Glossary). An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). A FONSI is a document that briefly presents the reasons why implementation of the proposed actions would not result in 'significant' environmental impacts (effects) beyond those already addressed in the John Day Resource Management Plan Final EIS (June 1984). If the decision maker determines that this project has 'significant' impacts following the analysis of the EA, then an EIS would be prepared for the project.

A Decision Record (DR) may be signed following public comment on the EA to document the decision.

1.2 Background and Context

The last decade 1992-2002 has seen record setting years with regard to fire statistics:

- In 1994 severe and extensive fires resulted in Congressional attention in the form of a bill known as "The Salvage Rider" to treat thousand of acres of burned forests.
- The year 2000 saw the worst fire season in 50 years (USDA & USDI 2001, Omi & Martinson 2002).
- In August 2002 – "Fires have burned 500,000 acres more than they had at this time during the record-setting 2000 fire season." (USA 2002)

In response to the 2000 fire season the United States Congress "directed the Secretaries of Interior and Agriculture to work with the Governors to develop [a 10-Year Comprehensive Strategy] in the [fiscal year] 2001 Interior and Related Agencies Appropriations Act (P.L. 106-291)" (USDA & USDI 2001, Reaves et al. 2002). This strategy set forth guiding 'Core Principles' and 'Goals' for the effort (See Appendix A). In 2002 an implementation plan for this strategy was set forth prior to the 2002 fire season. This implementation plan set forth four specific 'Goals' with related implementation outcomes and performance measures. More specifically for Oregon the Forest Service, BLM and State of Oregon collaborated to produce "An 11-Point Strategy for Restoring Eastern Oregon Forests, Watersheds and Communities" (See Appendix A).

The 2002 fire season attracted national attention highlighted by a Presidential visit to BLM lands in southern Oregon to discuss ongoing concerns, roadblocks and potential solutions to the fuel levels in forest lands. A publication – "Healthy Forests – An Initiative for Wildfire Prevention and Stronger Communities" was released after that visit. This paper attempts to address many concerns resulting from the 2002 fire season. This document is included in its entirety in Appendix A.

Although many types of forests exist and experience fire, the dry ponderosa pine (*Pinus ponderosa*) and mixed conifer forests are the primary concern in these efforts. The following description is excerpted from Brown, 2001 and provides a good description of a dry forest (similar descriptions and findings are also found in OFRI 2002, Covington 2002, USDA FS & USDI BLM 2002, Johnson & O'Neil 2001, Pollit & Omi 2002,Fiedler et al 2001, and Fielder et al 2002):

> "Dry forests of ponderosa pine (occasionally Douglas-fir) were shaped by what is some times referred to as a "stand-maintenance" fire regime of low-severity, frequent fires that generally burned grasses, brush, small trees, and fallen needles and branches, but had little effect on older trees with thick insulating bark. Death of lower branches from shading or the effects of fire raised the bottom of the canopy to the point where it was not adversely affected by typical fires.
>
> Periodically, small groups of older trees were killed by bark beetles and, often after falling, would be consumed by fire. This would leave exposed mineral soil and an opening in the canopy, ideal conditions for establishment of a group of young pine trees. This cohort of trees would be thinned by competition, insects, disease, and fire as they grew older; eventually replacing the patch of older trees that previously occupied the site. This dynamic would repeat across the landscape, producing extensive stands of large old trees that appeared even-aged but were actually comprised of many patches of trees of different ages (Weaver 1943). The clearing effects of fire produced the classic "park-like" stands of old-growth pine described by early settlers. These open forests of large old trees provide prime habitat for birds such as the white-headed woodpecker and pygmy nuthatch (Marshall 1997, Wisdom et al .2000). In extremely hot and dry weather, fires would tend to cover a larger area but still were unlikely to kill overstory trees (Agee 1997).
>
> While some areas still resemble historic conditions, it is these dry-site forests of ponderosa pine that typically have been changed the most by human activities in the last 150 years. Livestock grazing depleted the fine fuels that carried the light, frequent fires, while their hooves exposed mineral soil seedbeds for young ponderosa pine (Swetnam et al. 1999, Belsky and Blumenthal 1997, Miller and Rose 1999). Fire suppression, beginning after 1910 and becoming effective around 1940, allowed far more of these trees to persist, while logging removed most of the large old trees (Biswell et al. 1973). These forests may have been deprived of ten or more natural fire cycles. The result is forests that, due to continuing fire suppression, tend to burn less frequently, but when they do burn, the fire is much more likely to reach the forest canopy and spread as a crown fire, killing many or all of the overstory trees. A historically low-severity fire regime has turned into a high-

> severity or mixed-severity fire regime, a change that has occurred over millions of acres in the Interior Columbia River Basin (Morgan et al. 1996, Hann et al. 1997). These higher-severity fires are more apt to have detrimental effects on soils and watersheds, as well as wildlife habitat. They can have serious implications for humans who have chosen to settle in and around these forests."

The Little Canyon Mountain area typifies these conditions. It is largely populated by dry ponderosa pine stands with Douglas-fir (*Pseudotsuga menziesii*) present in many areas. Historic management actions have suppressed fires, and maintained presence and growth of the forest stand without substantial human intervention via timber removal or thinning. Conditions within the stand, at present, offer a higher than average likelihood that wildfire would lead to intense burning conditions with the result of entire stand replacement. The overstocked conditions coupled with years of drought, in addition to creating high fuel loads, have decreased the resistance and vigor of the forest, and trees within the stand are becoming more and more susceptible to insect infestations. At this time at least four insect species are infesting trees on the mountain and causing tree mortality.

The adjacent towns of John Day and Canyon City have been identified as communities at risk with regard to fire in the wildland urban interface (COFMS 2002a & b)(see Glossary). The Central Oregon Fire Management Services Fire Management Plan of 2002 describes the wildland urban interface:

> "… as a 1½ mile area surrounding each community on the list of 93… The 1½ mile area is assumed to be a sufficient distance to allow a crown fire advancing on the urban area to drop to the surface and burn with intensities that are manageable by ground based suppression forces (flame lengths less than 4 feet) ***if the fuels in this zone are managed for that purpose.*** This should account for spotting distances commonly observed under normal summer weather conditions as well. The concept would be to manage within the interface zone for surface fire habitat, much like managing vegetation for wildlife habitat objectives. Because fire takes its character from its context, managing vegetation and fuels for surface fire under defined weather conditions will allow for the kind of fire that is manageable with the suppression forces available."

The BLM planning area for the Little Canyon Mountain area falls entirely within this 1½ mile wildland-urban interface (WUI) zone around communities and residences. The Purpose and Need for this project is in alignment with several existing strategies with regard to wildland fire and forest health: (1) the Presidential Initiative for Wildfire Prevention and Stronger Communities – 'Healthy Forest'; (2) the Congressionally directed 10-Year Comprehensive Strategy; (3) Governor Kitzhaber's 11-Point Strategy for Restoring Eastern Oregon Forests, Watersheds and Communities; and (4) the Central Oregon Fire Management Services Fire Management Plan for Central Oregon.

Management actions considered (alternatives) within this Environmental Assessment will be developed with these efforts in mind.

1.3 Proposed Action

The BLM manages approximately 2500 acres of forest land in the Little Canyon Mountain Area situated between the city limits of Canyon City to the north, Little Pine Creek to the east, Canyon Creek to the west and the Strawberry Mountain Wilderness Area managed by the Malheur National Forest to the south. (Township 14 South, Range 31 East, Sections 1, 12 & 13, and Township 14 South, Range 32 East, Sections 6, 7, & 8.)

The Central Oregon Resource Area of the Prineville District BLM is proposing to treat the vegetation on Little Canyon Mountain in order to reduce hazardous fuels; improve fire suppression opportunities and safety consideration; reduce the risk from catastrophic wildfire to the mountain and the adjacent urban area of Canyon City; and to improve the health of the forest. The project area includes approximately 2500 acres of BLM managed lands adjacent to Canyon City and approximately 3 miles southeast of the city of John Day. Treatment would occur on up to 2200 acres through various forest thinning prescriptions, each addressed in the described alternatives, with anticipated completion within the next 2-3 years. Other actions proposed in this process address road access and maintenance within the project area, off-highway vehicle (OHV) use and illegal garbage dumping within the 'pit' area.

1.4 Need for the Proposed Action

The area to the south and east of Canyon City, Oregon is a short-interval, fire-adapted ecosystem primarily comprised of ponderosa pine and Douglas-fir. Management actions in this block of public land have led to a dense forest of ponderosa pine and Douglas-fir, which poses a fire threat to local homes and the town of Canyon City. These particular ecosystems are a high priority for treatment because, after more than 100 years without fire, they are currently at increased risk for severe fires.

The forest in this area is also suffering from an outbreak of several insect species. There is evidence of four bark beetle species inhabiting these forest stands, including the pine engraver (*Ips pini*), the red turpentine beetle (*Dendroctonus valens*), the western pine beetle (*D. brevicomis*) and the mountain pine beetle (*D. ponderosae*). Several patches of dead trees have developed in the last two years, numerous other trees are under attack currently, and mortality as a result of this infestation is expected to increase and as a result, increase the areas susceptibility to catastrophic fire.

Due to the marked changes in conditions on LCM the BLM has decided to analyze management options for the area.

1.5 Purpose of the Proposed Action

The primary objectives of this project are to:

1. Reduce Hazardous Fuels on LCM to manage surface fire and reduce crown fire potential in order to protect resources on the mountain and adjacent urban areas from catastrophic loss.

Indicator: Percentage of BLM managed lands that would maintain surface fire behavior even under extreme weather conditions.

2. Improve Fire Prevention and Suppression Opportunities on BLM managed lands within the project area.

Indicator: Acres of defensible space (40-60 basal area (BA)) within ¼ mile of the wildland-urban interface boundary and associated structures.

3. Improve Forest Health by reducing stand densities and competition and stress among trees to promote healthier, more vigorous and robust tree stands which are more capable of resisting parasitic insect infestations and decrease the potential for continuous running crown fire.

Indicator: Percentage of BLM managed lands within various densities (basal area ranges) that enhance tree vigor and reduce competition and stress between trees.

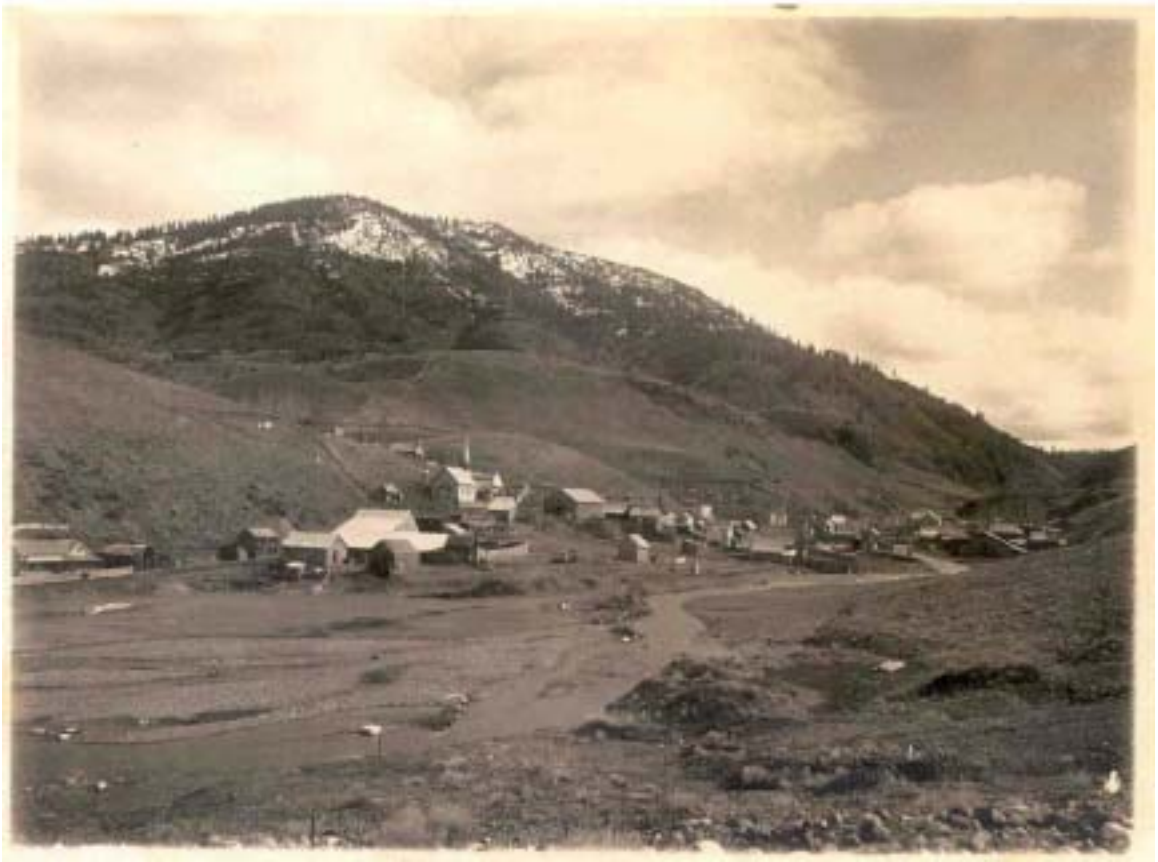
This analysis will address these relevant concerns:

- fuels reduction to minimize future catastrophic events
- wildfire risk to adjacent residences
- current and potential forest health (insect infestation susceptibility)
- access and conditions of existing roads within the area
- access and potential impacts to mining claims
- social and economic impacts
- relevant ICBEMP science guidelines with respect to fuels treatments
- appearance of the mountain after treatment

All action alternatives would result in a reduction of hazardous fuels and improvement in long-term forest health and fire prevention and suppression opportunities. The extent to which a particular alternative accomplishes these goals is described in Chapter 2 – Comparison of Alternatives Table 2.5 Indicator Measures by Alternative.

1.6 Initial Public, Tribal, State and Local Scoping

Beginning in May 2002 the BLM participated as part of a public interest group in Grant County to address issues concerning fire hazard to the local community specifically with regard to forest conditions on LCM. Since this time, the BLM has coordinated with several state agencies including the Oregon Department of Forestry (ODF) and Oregon Department of Fish and Wildlife (ODFW). Initial public scoping began in late August 2002 with the release of a Project Involvement letter sent to all publics interested in LCM and this type of project. At this time an internet web site was published and electronic mail (e-mail) established to receive input from any interested parties. Since that time eight letters and 13 e-mails have been received by the Central Oregon Resource Area. The majority of comments have centered on their interest in seeing the BLM address the LCM area and protecting Canyon City from catastrophic wildfire as witnessed in Colorado, Arizona and Oregon in 2002. One letter detailed a scenario for treatment and was subsequently incorporated into this EA as an alternative and analyzed accordingly.



1.7 Issues to Be Resolved By Alternatives

Throughout the initial project description process, the interdisciplinary team (IDT) developed and refined specific concerns and focus areas within each of the primary objectives. The following questions and descriptions clarify these concerns:

1.7.1 How should hazardous fuels be managed to provide for long-term public safety, ecosystem health and ecological integrity with respect to the following requirements?

Reduce the undesired risk of unplanned wildland fire to Little Canyon Mountain, neighboring communities and the residents of Canyon City.

Over the last 140 years, ponderosa pine has encroached naturally on the lower fringes of Little Canyon Mountain. These stands, composed predominantly of ponderosa pine, now contain trees of varying sizes and varying species including western juniper (*Juniperus occidentalis*) and Douglas-fir. Management activities have been minimal in this area and the stands are fairly dense and exceed the Upper Management Zone (UMZ) of 100 basal area (BA) (see Glossary) of the site in many areas. In addition, many trees are currently dead or dying as a result of insect infestation. Concerns have been raised that an unplanned wildfire, particularly a crown-fire event, could not only catastrophically damage the vegetation on the mountain due to heavy, contiguous fuels, excessive dead fuel loads and dense stand conditions, but also threaten the lives and resources of people living adjacent to the mountain and in the nearby Canyon City.

> **Indicator:** Percentage of BLM managed lands that would exhibit surface fire regimes under extreme weather conditions.

Improve chances for safe, successful fire suppression in the future to protect resources and neighboring communities.

The combination of heavy, contiguous fuels, excessive fuel loads and dense stand conditions not only threaten the safety of nearby communities, but also the safety of fire fighters protecting the area. In the lower slopes, beetle induced mortality is establishing high fuel concentration areas, capable of creating intense fire behavior. Ladder fuels, including small trees, low branches and shrubs are abundant in the project area, generating opportunities for surface fires to climb into the crowns in approximately 50 percent of the stands. In the mid- and upper-slope areas the overstory is often dense and closed with slopes increasing to 40 to 60 percent. Unplanned wildfire, whether human caused or a natural start, has the potential to become a severe, fast moving fire under average summer weather conditions. Current vegetative conditions could make effective, safe fire suppression a challenge.

Indicator: Acres of defensible space (40-60 BA) within ¼ mile of the wildland-urban interface boundary and associated structures.

Reduce insect damage, reduce the numbers of lethal insects and restore vigor and insect resistance to remaining live trees.

As the result of an infestation of four species of bark beetle, many trees, susceptible to infestation due to the undesired effects of high stand density and continued drought conditions, have died over the last two years. Bark beetles are opportunistic species that are able to infect trees with reduced health. After many years without a significant disturbance event, the stands have become fairly dense and they are experiencing noticeable reduced vigor. Without management activity the beetle populations are expected to continue to grow and tree mortality is expected to be two to four times the current level. As the insect population increases within the forests on public lands due to their reduced vigor and increased susceptibility to insect infestations, the risk to private forest resources is also increased.

Indicator: Percentage of BLM managed lands that are below the UMZ of 100 BA that enhance tree vigor and reduce competition and stress between trees.

1.7.2 How should vegetative and land management activities be carried out to minimize detrimental effects to visual resources and air quality?

Little Canyon Mountain is located along Hwy 395 south of John Day and Canyon City, Oregon. The Strawberry Mountain Wilderness Area, managed by the Malheur National Forest, borders the project area on the southeast side. In addition, several private residences are located immediately adjacent to the area. Concern has been raised over not only the effects to visual resources if fuels are treated in the project area, but also the effects to visual resources if fuels remain untreated, beetles continue to kill trees or a catastrophic crown-fire burns the project area.

Concerns also exist over the potential for short-term smoke (from prescribed or wildfire) in the cities of John Day and Canyon City, along the highway adjacent to the project area, and in the Strawberry Mountain Wilderness area.

Indicator: Degree of visual contrast in the elements of form, line, color and texture.

1.7.3 How can the transportation facility in the project area and vicinity be managed to provide safe mining-claim, public and administrative access, discourage illegal activities, and improve water quality and wildlife conditions?

Roads and trails in the Little Canyon Mountain area provide access for resource management and monitoring activities, recreational uses, mining and mineral exploration and to the Canyon Mountain Trailhead and Strawberry Mountain Wilderness. Livestock and wildlife use the trails and roads to move between water sources and summer and winter-feeding grounds. Roads provide firebreaks and access for fire protection and would provide an existing transportation network for thinning out overgrown timber stands.

Roads in the project area also provide access for illegal activities such as trash dumping, illegal fire wood collection, trespassing on private land, and illegal hunting and shooting. Increased OHV use in the area has created new trails that cause soil compaction and erosion.

The existing transportation network in the project area has been developed primarily to service mining claims, and access to these claims must be maintained.

> **Indicator:** Miles of road improvements on existing access routes that reduce surface erosion and improve drainage.
>
> **Indicator:** Miles of obliteration of unnecessary, existing access routes which reduce surface erosion and improve drainage.

1.7.4 How can the ramifications on traditional recreational use in the LCM area as a result of proposed management actions be managed to maintain existing recreational uses and discourage illegal activities?

A variety of recreational opportunities are available in Little Canyon Mountain area including but not limited to: off highway vehicle (OHV) use, four-wheeled drive (4x4) use, hiking, hunting, mining, target practice and access to the adjacent wilderness area.

The 'pit' area is popular for recreational activities such as OHV riding, 4x4 use and target practice; however, it is also being used for illegal garbage dumping activities which reduce the recreational appeal of the area for other uses.

> **Indicator:** Acres of vehicle closures designed to reduce illegal garbage dumping.

1.7.5 How can the land management activities of this project be designed to meet PACFISH standards and maintain water quality and quantity for authorized and beneficial uses?

While there are many competing beneficial uses in the streams on Little Canyon Mountain, federal law requires BLM to protect the *most sensitive* of these beneficial uses. The most sensitive beneficial use in Little Pine Creek is salmonid fish rearing.

The Oregon Water Resources Department has issued permits or certificates for the use the water on Little Canyon Mountain. The area has a combined total of 22 permits and certificates for irrigation, mining, domestic and municipal beneficial uses. In addition, Oregon Administrative Rule (OAR) #690-506-0020 lists erosion damage caused by high stream flows on Canyon Creek as a subbasin special concern.

Historic hydraulic mining activities and the construction of roads across the Little Canyon Mountain area have altered the natural hydrology of the area. Roads increase the hydraulic connectivity and hydraulic mining has disrupted the hillslope processes. A 200-foot reach of Little Pine Creek extending through mine tailings flows subsurface in the summer. The BLM needs to ensure that management activities associated with this fuels reduction project do not further disrupt the natural stream flow regime of active channels throughout the area.

Indicator: Acres of ground disturbing activities from heavy equipment.

1.7.6 To what degree should the economic value of the fuel reduction bi-products be considered in the proposed action?

Though livestock production and agriculture are important sources of income throughout the John Day Basin, the forest products industry is economically important to several communities in the basin, including John Day, Prairie City, and Canyon City. The fuel reduction bi-products that would result from the proposed action may contribute to the economic interests of those local communities without compromising the project objectives.

Indicator: Value of timber bi-products generated from fuels thinning activities.

1.8 Conformance and Consistency with Existing Plans

The Little Canyon Mountain area is managed under direction given by the John Day Resource Management Plan (RMP) (USDI BLM 1984) and associated Record of Decision (USDI BLM, 1985). Direction in this RMP designates this area as part of the BLM commercial timber base managed for timber production.

The proposed actions as addressed in this EA are consistent with the John Day RMP, as stated in the Record of Decision (ROD)(USDI BLM 1985):

> " The overall goal of the plan is to emphasize production of livestock forage and other commodities while accommodating wildlife, recreation, visual resources, water quality and wild horses. The multiple use trade-offs between resources help maintain and protect big, small and non-game habitat, riparian and aquatic habitat, recreation use, cultural and botanical resources, esthetics, and wild horses." (Page 12.)

Little Canyon Mountain is included within the 30,962 acres that are designated within the John Day RMP/ROD as "available for full timber production" for the "commercial tree species" (page 13). The following guidance also pertains to the area:

> "Manage forestland to minimize losses or damage to commercial tree species from insects and disease. Develop road systems and manage for harvest of commercial tree species…" (page 13).
>
> "Utilize existing road systems and limit new permanent road entries by emphasizing the use of special timber harvest techniques. Restrict human activity adjacent to active raptor nesting and roosting areas during specific periods of the year." (Page 18).
>
> The John Day RMP also addresses the visual resources of the Little Canyon Mountain Area:
>
> "Visual resources would continue to be evaluated as a part of activity and project planning. Such evaluation will consider the significance of the proposed project and the visual sensitivity of the affected area. Stipulations will be attached as appropriate to assure compatibility of projects with management objectives for visual resources." (Page 28).

The BLM John Day Resource Management Plan (RMP) (USDI BLM, 1985) identified the visual values on public lands within the planning area and established visual management objectives for these lands, according to BLM's Visual Resource Management (VRM) policy (USDI BLM, 1984). The RMP identified the visual management objectives for the public lands within the LCM project area as Class II, which BLM's VRM policy defines as:

> "Class II Objective. The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape." (USDI BLM, 1986, page 6.)

All actions addressed are also consistent with guidance and direction that supercedes the 1985 RMP such as the Environmental Assessment for the interim strategies for managing anadromous fish producing watersheds in eastern Oregon and Washington, Idaho and portions of California (USDA FS and USDI BLM 1995).

> "Design fuel treatment and fire suppression strategies, practices, and actions so as not to prevent attainment of Riparian Management Objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function, listed anadromous fish, or designated critical habitat." (Page C-15 – Fire/Fuels Management)

This assessment also incorporates the Interior Columbia Basin Ecosystem Management Project's (ICBEMP) Scientific Assessments with regard to various resources. The Purpose and Need of this project addresses several findings from ICBEMP's Integrated Scientific Assessment (Quigley et al. 1996) including:

"Forest Health - We found that forested ecosystems have become more susceptible to severe fire and outbreaks of insects and diseases. Reducing these risks and hazards involves maintaining forest cover and structure within a range consistent with long-term disturbance processes."

1.9 Decisions to be Made

As a result of this process the BLM will make decisions regarding:

- What type and to what extent fuel treatment would occur in the area?
- What methods for implementation would be used?
- Whether to re-route the existing main access road outside of PACFISH buffers within specific areas?
- Whether to improve the existing main access road from the county road to the forest boundary?
- Whether to close the 'pit' area to large vehicles capable of depositing garbage in the area?
- Whether to close any roads within the project area?
- Whether to provide fish passage over an existing road easement across Little Pine Creek for fish?
- Whether to install a livestock management fence along Little Pine Creek?
- What type and to what extent mahogany treatment would be included?

Chapter 2
Description of Alternatives

2.1 Introduction

This chapter describes a range of alternatives, including the no action alternative, which address the objectives and concerns as described in Chapter 1 – Introduction: Purpose and Need. Each alternative description includes a brief narrative followed by specific design criteria and a summary of concerns addressed. Unless noted otherwise each action alternative defines the wildland-urban interface boundary as it is defined in the Central Oregon Fire Management Services Fire Management Plan (COFMS 2002a) – a 1.5 mile boundary around private land boundaries and urban areas. Under this definition all of the lands managed by the BLM in the Little Canyon Mountain Area are within this wildland-urban interface boundary.

The Interdisciplinary team (IDT) has given consideration to several treatment alternatives for the project area. While the need for a hazardous fuels reduction was never in question for this area, there are several methods for reducing fuel loads. In all methods, the goal is to lower stand densities and create discontinuity in the vertical fuel profile in order to limit the potential for crown fire. This vertical fuel load is often referred to as "ladder fuels," and the goal of vertical fuel reduction is to essentially, remove several "rungs" from the ladder, making it difficult for a fire to climb into the canopies or to sustain itself once in the canopy.

The purpose of many fuels reduction projects is not to eliminate fire from the ecosystem, but to create fire-resilient forests with characteristics that limit the behavior of surface fires and that have a greater resistance to crown fires. Crown fires are created when a surface fire generates enough heat and energy to combust fuels above the surface, resulting in torching of individual or groups of trees. These characteristics are guided by Four principles guide actions that affect crown fire potential and behavior: reducing fuels on the ground (surface fuels), increasing the distance from the ground to the live crown on the trees, reducing crown density and retaining larger trees (Table 2.1). Canopy density is quantified by the "crown bulk density" (see Glossary), a measure of tree size and density and live crown height. Crown-bulk density values above 0.006 lbs/ft^3 (where tree crowns touch and overlap) appear to sustain crown-to-crown fire spread, significantly increasing the potential for tree mortality and decreasing the ability of firefighters to safely fight the fire. Tree size and density is described by the basal area (BA) (a measure of the cross-sectional wood fiber in the tree bole at breast height – see glossary for further details) of the stand; therefore - the greater the basal area, the greater the crown bulk density, the higher the risk of crown fire. Basal area can also be used to describe a stands susceptibility to insect infestations (see Entomology and Silvicultural descriptions). For these reasons basal area was measured in the project area and used to describe the stands potential risk of crown fire and insect infestation.

Table 2.1. Principles of fire-resilient forests. (Adapted from: Fire in Oregon's Forests: Risks, Effects and Treatment Options. Fitzgerald, 2002.)				
Principle	Method	Effect	Advantage	Concerns
Reduce Surface Fuels	Burning of piles, crushing fuel, prescribed burning.	Reduces potential flame length.	Control of fire is easier, improved safety for firefighters, less torching.	Surface disturbance, less with prescribed (Rx) burning than other techniques.
Increase Height to Live Crown	Thinning smaller trees and pruning up to 10-12 feet, either manually or with Rx fire.	Requires longer flame length before torching can initiate.	Less torching, improved safety for firefighters.	Opens understory, may allow surface wind to increase.
Decrease Crown Density	Thinning in combination with surface fuel reduction	Makes tree-to-tree crown fire less likely.	Reduces crown fire potential, improves firefighter safety.	Surface wind may increase and surface fuels may be drier.
Retain Larger Trees	May be interpreted as a diameter limit when thinning, but includes spacing and should be a recognition that large trees are more fire resistant	Thicker bark and taller trees.	Increases survivability of trees.	Removing smaller trees is economically less profitable.

Implementing one or all of these fire-resilient forest principles could reduce the threat and decrease the negative effects of an unplanned wildfire event (Cleaves 2002). On-the-ground evidence demonstrates that reducing or mitigating fuel density and composition can reduce wildfire intensity and the potential for destructive crown fires. Fuel breaks can, and have, caused crown fires to drop to the surface as the fire passed through and was denied the fuel needed to sustain it (Fitzgerald, 2002). Fires restricted to the understory (surface fires) are generally less fatal to trees and other vegetation, and result in less damage to soils and watersheds. On the other hand, stands comprised of mid- and overstory trees, as well as understory vegetation, tend to have a lower crown-base height and an "increased probability that flames of a ground fire will torch the trees" (Fitzgerald, 2002).

The historic condition is also an important consideration for this project area. Prior to European settlement areas like LCM existed under a different environmental and/or

management regime, which lead to the conditions encountered during settlement. In order to describe some type of 'natural' condition a historic range of variability must be described. The IDT gave consideration to the historic documentation and scientific research that points to a different 'historic' ecosystem which apparently existed until the late 1800s, and that further broadens the historic range of variability for conditions on LCM.

With these concerns in mind the IDT developed a series of action alternatives that reduce fuel loads and the threat of wildfire.

Several broad approaches can be taken in order to achieve these objectives (Graham et al. 1999).

1) The first approach is to 'thin from below' by removing trees up to a specified tree diameter maximum.

2) The second approach is to remove a specified percentage (e.g. 50 percent) of the existing tree vegetation across the landscape beginning with the smallest diameter trees, measured by basal area

3) The third approach attempts to restore sustainable structure and function to the forest by focusing on trees to leave in terms of a maximum target basal area in conjunction with species composition. In general, a maximum basal area (BA) target of 40 – 60 square feet per acre (Lane 2002) is sufficient to keep a fire from crowning, except under the most extreme conditions (e.g. winds in excess of 75 mph).

Due to the extremely high existing basal areas (in excess of 100 BA), the first two approaches do not reduce fuel loads to adequately minimize crown fire risk to the surrounding communities while maintaining or retaining a sustainable forest structure. In addition, when not thinned sufficiently, these stands have the potential to return to pre-treatment densities faster than a normal prescribed burn treatment interval could be implemented.

The third approach leaves primarily healthy, large trees (greater than 16 inches diameter at breast height (DBH)), although some trees from other diameters are left as well to provide for a more diverse structure. Not only does this reduce tree density and the threat of catastrophic crown fire, but it also promotes tree vigor and increases growth of existing trees. Based on research from the University of Montana, this method would meet the short-term needs of reducing existing fire hazard conditions, and would retain a low fire hazard rating for several decades after treatment (Fiedler et al. 2001).

Alternative B follows the first approach while alternatives C through F follow the third approach.

2.2 Alternatives

Within this section each alternative is described in detail, followed by a map of the alternative and visual depictions of the average stand conditions before and after treatment. This section describes the particular design criteria for each alternative and describes what actions would be taken. Sections 2.4 – Comparison of Alternatives describes how each alternative does or does not meet the purpose and need as described in Chapter 1, and quantifies the indicators developed to reflect the issues.

The visual depictions are based on the stand exam data collected in September 2002 for this project. In order to graphically represent the stand conditions a model known as Stand Visualization System (SVS) (USDA FS 2002) was employed. This model was created by the Forest Service to depict actual stands and the resulting effect of forest treatments. In order to show an average stand a selection of individual stand data was combined from each treatment area. This data was then averaged to derive conditions in an 'average' stand. The 'average' stand likely does not exist on LCM, these depictions are attempting to visually describe the existing and after treatment conditions in general for each alternative and are not meant to represent actual stands on LCM.

In these graphics red trees represent juniper trees and green trees represent ponderosa pine and Douglas-fir trees.

After the stands were visually depicted, SVS generated a total basal area and percentage of cover for each stand. These numbers are included in the tables associated with the stand depiction they correspond to.

In all instances the basal area calculated by SVS was very close to the basal area calculated within the stand exam analysis.

While cover was not measured in the stand exam data collection process, SVS derived a percent cover value using a graphical method based on overhead views. Since there was not data available to compare these derived values to, it is unclear how accurate these values are. However, based on the relative accuracy of the basal area calculations, the percent cover is taken to be relatively accurate.

Through these depictions the BLM is seeking to describe what representative stands would look like after treatment is completed under each alternative.

2.2.1 Alternative A – No Management Action

This alternative does not include any further management actions. The conditions as a result of past management in the Little Canyon Mountain area would continue. Natural processes would be the sole driving force in the conditions in this area. Forest stands would be left in current conditions. This includes sizable areas of insect infestation and mortality as well as overstocked and dense forest stands. No Management actions would be implemented to reduce hazardous fuels in the wildland-urban interface of John Day and Canyon City.

Conditions would remain and additional fire fuels would accumulate increasing the threat of catastrophic fire on the mountain and to the adjacent towns.

There are no specific design criteria for this alternative. All designs are left to natural processes; i.e. the present management situation would continue including initial fire suppression activities.

This alternative does not address the reduction of hazardous fuels, recovery of any economic value for dead standing timber or fuels treatment bi-products, nor does it address management actions to promote forest health concerns.

2.2.2 Design Criteria Common to All Action Alternatives

During the formulation of proposed activities for this project specific project mitigation actions were described. These mitigations were incorporated as project design criteria that are common to all alternatives where they apply (see this section and Section 2.2.4).

i. On acres with slopes greater than 35 percent only aerial yarding would occur to eliminate ground impacts in steeper soils.

> The John Day RMP (1985) describes the conditions under which ground based logging can occur on BLM managed lands (on slopes less than 35 percent (Brooks et al. 1991)). LCM is easily divided into steep slope (greater than 35 percent) and lower slope (less than 35 percent) area. These areas also correlate with the road and non-roaded areas on LCM. Tree removal on lower slope areas (less than 35 percent) will occur as a ground based operation utilizing the existing roads and trails in the area. Tree removal on higher slope areas (greater than 35 percent) will utilize helicopter and be completed as an aerial yarding operation.

ii. Minimize ground disturbance to protect soils from excessive erosion, compaction and disturbance.

> For ground based yarding, if ground is not frozen with a snow cover, designate main arterials trails (over 3 passes [out and back on the same trail is 1 pass]). Compaction can occur during the first half-pass, the more passes the higher likelihood that rutting and compaction will occur. Limiting passes minimizes this hazard. In addition the more moisture content within the soil surface at the time of activity the more likely rutting and compaction would occur. Subsoil (see Glossary) skid trails used more than 3 times, and plant with native trees, shrubs, and grasses. It is not recommended to skid when the ground is wet. In order of preference: (1) Helicopter logging compaction not a concern. (2) Frozen ground with 6 inch plus snow cover has no pass limitations. (3) Dry ground - 3 pass limit, monitor and check for compaction effects. (4). Moist ground – track or designate paths with three pass limit then subsoil. (5) Wet ground – do not skid.

Keep soil disturbance impacts to less than 20 percent (including existing roads, trails and previously disturbed areas) using Forest Service guidelines. To keep within the 20 percent guides, keep 3 pass skid trail impacts to distances of 100 feet apart or greater from each other.

No new permanent roads would be necessary for this operation. Less than ¼ mile of new temporary roads (several short spurs or existing road extensions) would be necessary for landing area placement for both tractor and cable yarding systems. No new temporary roads would be necessary for helicopter-yarded areas.

iii. Utilize existing roads and trails for decking.

The ground based operation will utilize existing roads and trails and deck logs in and along side existing roads to limit ground disturbance and soil compaction.

The aerial based operation will utilize two landing zones/deck areas: (1) at the top of the mountain in the deck area created from the previous South Little Canyon operation; and (2) within the 'pit' area on the north side of the mountain.

iv. Maintain and upgrade existing access roads.

The access roads will need localized maintenance and upgrading to minimize soils movement via the roadway and to support timber haul.

v. Follow Northern Goshawk Management Guidelines for goshawks in the area.

Goshawk nests will be buffered by a 30-acre no treatment area and a 400-acres post fledgling/family area (PFFA) of concern. Treatments within the PFFA may be slightly modified or seasonally restricted.

The objectives and prescriptions for the management of northern goshawks will be to: (1) identify active nest sites, (2) protect the active nest sites from adverse activities, and (3) establish a post-fledgling family area (PFFA) around each nest site.

vi. Buffer springs utilized for domestic use to maintain the integrity of the springs.

Within the project area are three springs utilized for domestic water. One of the springs is located within a PACFISH buffer that would not be treated, the other two springs will be buffered by a 300-foot diameter no-management area, to protect the integrity of the spring areas.

vii. Schedule thinning operations and the creation of slash piles outside of the January to June window.

An important consideration for the management of pine engraver populations is to insure that habitat is not created for them in the process of thinning stands. The pine engraver prefers down material such as slash, and can build large populations in this material to later infest standing trees. The guidelines for timing of thinning operations call for avoiding slash creation between the months of January and June (Livingston 1979).

viii. Reduce the amount of pile burning of slash to protect soils from intense burn exposure.

Lop and scatter pole slash on the ground from thinning operation to reduce the number of hand piles and the area burn effects on the soil from hand pile burning. A slash rate of about 1/4 to 3/4 pound per square foot was recommended for forest health in ponderosa pine stands (Debano et al. 1998), and to help limit ATV and vehicle traffic in non-roaded areas.

Whole tree yarding of trees and logs less than 24 inches diameter on the large end would be required in order to minimize ground slash and concentrate impacts of slash disposal in limited areas. These trees and logs would be yarded, with limbs and tops attached, to a landing area where the resulting slash would be piled and later disposed of by chipping or by pile burning. Because of yarding equipment weight limitations, trees or logs larger than 24 inches diameter on the large end would be limbed and toped within the unit. This slash would be piled and burned within the project area or disposed of by broadcast burning.

ix. Protect existing cultural resources from disruption or degredation.

Foremost will be the protection of the most intact ditch systems. This will involve designing vegetation management activities in a way that avoids disturbing the ditches. Avoid: 1) skidding and yarding in the vicinity of the ditches; 2) and cutting or falling trees growing in or immediately adjacent to the ditches. Standing structures, such as the Ike Guker home complex or the Millar Place, will be avoided until a formal assessment can be conducted. Active lode mines and associated structures and features will be avoided. Large hydraulic mined areas such as the Marysville Placers present a challenge, they may be considered a part of the rural historic landscape of the early and later mining eras. All timber management activities within these areas will need to be designed to limit the impacts to tailings and ditch features. Creating log landings in previously disturbed areas and limiting skid trails to certain paths can accomplish mine feature protection. An archaeologist should be involved when designing the fuels reduction management actions.

x. A burn plan would be initiated prior to any pile burning in the project area to manage smoke emissions and escape risk.

Based on a variety of environmental factors including weather, humidity, fuel moisture and the number of piles, a "prescription" would be determined that would describe the conditions under which pile burning could occur. These prescriptions are designed not only to control the intensity of any burns and maintain safe

conditions, but also to stay below PM 10 emission standards. In the event that an area exceeds the PM 10 standard, the burn plan also contains measures to control and extinguish the prescribed fire. In addition, the burn plan would be designed to comply with all applicable State and Federal air quality laws and regulations, and would be coordinated with the appropriate air quality regulating agencies.

2.2.3 Alternative B – Blue Mountain Biodiversity Project

During the course of initial scoping and public involvement for this project the BLM received a thorough description of one treatment alternative for Little Canyon Mountain from the Blue Mountain Biodiversity Project (BMBP). After review of this description the IDT decided to accept it as an alternative and analyze it accordingly. This decision was reached since the detail used in the description could be directly applied to the ground and impacts assessed. In the following description of this alternative the original proposal is presented first followed by any clarifications as described by the IDT in bold. For the purposes of this alternative the wildland-urban interface boundary was defined as "…urban interface area (between 50 to 1000 feet depending upon terrain, prevailing wind directions, and vegetation types)" (LOWD 2002).

In this alternative a fuel break would be created up to but not exceeding 1000 feet inside the project boundary. The boundary is defined as the wildland-urban interface boundary between BLM and private lands, primarily covering the west and north sides of the LCM project area. For the purpose of analysis the maximum 1000-foot area was considered. Within this proposed fuel break, the following guidelines will be implemented under this alternative:

"Minimum Mandatory Guidelines For All Projects Purporting To Be Restoration, Forest Health, and/or Recovery Projects Within Interior Pacific Northwest Forests

I. All proposed projects, which purport to fall within the categories of restoration, forest health, and/or recovery, must be motivated by ecological need. Restoring wildlife, fisheries, botanical, and soils habitat, ecological integrity and watershed functioning must be the integral interwoven driving goals of proposed projects. As commercial logging has been both the direct and indirect cause of forest and aquatic ecosystem degradation, it cannot be a major objective of these projects. Any commercial logging included within a proposed project must be secondary in consideration, and subservient to needed restoration objectives. Commercial logging's potential (if any) exists only in so far as it results from the implementation of needed methods to meet the project's goals. Funding for any project proposed within restoration or forest health categories cannot be tied to commercial logging. The financial means to accomplish the project and its goals must be firmly established, independent of any secondarily proposed commercial logging. Commercial logging utilized in restoration/forest health/recovery projects must fully meet all of the following conditions:

A. No logging of trees greater than 12 inches diameter breast height (dbh).

B. No logging on steep slopes above 30 percent.

C. No logging on slopes greater than 20 percent, which are geologically unstable, prone to erosion, slumping, and/or slides. **After review there were no areas identified on Little Canyon Mountain within the 1000-foot designated fuel break that were geologically unstable.**

D. No logging within riparian areas; including rivers, streams, creeks, seasonal and ephemeral drainages, runoff draws, seep and spring areas, ponds, lakes, bogs, swamps, and seasonal bogs. No logging within established buffers for any of the above. PACFISH and INFISH buffers must be doubled when the slope angle exceeds 15 degrees and/or when the soils are geologically unstable and prone to erosion, slumping, or landslides. **The IDT converted slope degrees to slope percentage; which converts to 25 percent. Due to the topography of Little Canyon Mountain very few areas adjacent to streams have slope below this criteria therefore PACFISH buffers, where applicable, were doubled across the project area.**

E. Heavy machinery and/or logging methods which result in further compaction of area soils cannot be used.

F. Subsoiling is not a viable "mitigation" for compaction due to its destructive impacts upon the forests' soil fungal, microbial, and vegetative communities. Subsoiling may only be utilized in restoration of areas previously compacted-such as closed road beds, log landing decks, skid trails, closed mine sites, areas of heavy livestock compaction or recreational over-use. Subsoiling cannot be used when it will result in further soil erosion and sedimentation to area aquatic systems.

G. Canopy closure of 60% in mixed conifer stands, and 45% in ponderosa pine stands must be retained. If canopy closure is below these percentages no commercial logging can occur at all. **Mixed stands were defined by the IDT as conifer/non-juniper.**

H. No extirpations of any old growth dependent and/or forest canopy dependent species can occur within the project area, including within any of its individual "units".

I. Site-specific surveys for all species which currently utilize project and adjacent areas must be conducted as part of proposed projects' development and planning.

J. All habitat requirements and components must be retained for all old growth and forest canopy dependent species, including: goshawks, pileated woodpeckers, black-backed and northern three-toed woodpeckers, white-headed woodpeckers, pygmy and flammulated owls, pine marten, fisher, wolverine, lynx, wolf, black bear. Townsend's big-eared bat, neo-tropical migrant and native birds, etc.

K. Watershed quality must be maintained and improved by the project.

L. Habitat conditions for all fish, ESA listed aquatic species, and species of concern, must be maintained and improved by the project. No "take"/mortality of any individual members of listed species can be permitted. No extirpations of any of these species can occur.

M. Livestock grazing issues, concerns, and degradation must be addressed, and conditions must be improved, including implementing as needed effective livestock exclosures, reductions in the numbers of livestock, removal of livestock, and/or resting or terminating grazing allotments. Livestock grazing cannot be "outside the scope of the project".

N. The cumulative impacts of all management/extraction activities on project area and adjacent public and private lands must be addressed and disclosed in the project's analysis and planning. Wildlife, fisheries, and ecosystems do not recognize artificial human societal boundaries. Projects must be modified to address cumulative area impacts. The cooperation of adjacent area private landowners must be sought in working to achieve restoration objectives.

O. Absolutely no new road construction, including no "temporary" roads and no re-opening, or temporary use of, any closed roads.

P. No commercial logging within roadless areas larger than 400 acres. No tree felled "fuel breaks", helicopter landing pads, or industrial incursions that would change the natural historic character of any roadless areas. **Since the BLM does not have designated roadless areas the term roadless was taken by the IDT to mean non-roaded for the purpose of this project. In the analysis, trails and OHV routes were not considered as 'roads'.**

Q. The extent of prescribed fires must stay within the area's historical natural range of variability for fire intervals and number of acres burned. Spring burning should not occur in areas in which it was historically uncommon. Aerial ignition of prescribed fires must not be utilized to avoid detrimental impacts to wildlife dens, nests, middens, burrows, rare and sensitive plants, and needed habitat components. Unnatural "fuel breaks" cannot be created. **Unnatural 'fuel breaks' would seem to preclude any type of human caused fuels treatment involving the removal of trees and ladder fuels for the purpose of managing fire 'habitat'. Since the 'natural' processes to remove or limit fuel and create fuel breaks are topography, geology, time (decomposition) and fire; treatments that involve other means would seem to be prohibited. This interpretation would revert to the No Management Action Alternative as described previously. Since this interpretation would render all other design criteria described in this alternative moot the IDT decided to retain human caused treatments within this alternative.**

R. Wildlife corridors with sufficient hiding cover, including necessary natural thickets, must be retained. New OHV/ORV trails cannot be part of the project.

S. The project cannot result in the further spread of exotic invasive plants. Chemicals and,/or herbicides cannot be utilized by the project.

T. Chemicals, pesticides, or biocides cannot be utilized to kill, control, or manipulate any native insect species populations, including periodic "outbreak" cycles (which are a natural component of forest ecosystems).

U. No misapplication of blanket ecosystem theories, eg: "ponderosa pine park-like stands", "fir encroachment'", etc. to historic mixed conifer stands or dense mid to high elevation multi-storied p.pine stands, etc. Proposed project planning must be site specific, accurate, and ground-truthed as to the actual historical

natural composition and density of area forest stands. Planning must also address the cumulative impacts to the area's adjacent forest habitat, and the current wildlife dependence and utilization of the project area. Planning must be modified accordingly to protect wildlife needs and long-term area recovery.

V. Non-commercial methods to accomplish project goals must be presented as viable alternatives, and their impacts accurately assessed as compared to any proposed commercial methods. **Particular methods of forest treatment are not divided into commercial versus non-commercial categories. This Environmental Assessment analyzes objectives rather than methods.**

W. Proposed projects must fully comply with all environmental policy laws of this nation. The NEPA process must be utilized with full appeal and litigation rights. Negotiations resulting in the separation of portions of projects; which have environmental, public, and scientific consensus may be utilized to allow necessary timely projects to proceed. An automatic stay upon all controversial portions of projects pending final outcome of judicial review, including appeal, must be granted as part of project guidelines.

X. Projects must address how to restore unregenerated and under-regenerated old logging areas, and other detrimental impacts from past management activities: skid trails, slash piles, high road densities, sources of continuing sedimentation, excessive high watershed temperatures, etc. Projects must focus on finding solutions to these serious issues before proposing any more commercial logging- of any type-within area forests.

Y. This is intentionally left open to:

a. Allow for additional watershed site specific and/or proposed project specific information to be included; and

b. To acknowledge that needed restoration is an evolving process of understanding and awareness, which must remain open to facilitate incorporation of areas and issues which may need to be included within these guidelines.

II. Proposed projects must meet all of the above guidelines, including non-commercial restoration projects. All proposed projects must include both non-commercial methods for accomplishing their goals, as well as viable funding sources for their accomplishment. Agencies are encouraged to work with native nations, citizen environmental advocacy organizations, and area private landowners in developing comprehensive and potentially successful ecosystem restoration projects.

III. Monitoring and Compliance: All projects must be accurately and honestly monitored for compliance with all of the above guidelines, both by responsible agency personnel (who must be adequately funded, equipped, and spend sufficient time in the project site) -and by independent groups. Projects must be halted when the above guidelines are not being met, or whenever it becomes apparent that the project's restoration goals cannot be achieved by the methods then utilized.

Restoration and forest health are relatively new fields, on the current scale and focus, for many public agencies and their personnel. Commercial companies and contractors, not limited to logging personnel, are even more recent (and historically

> reluctant) to embrace these concepts in word or deed. The management track record in the forest yet remains dismally close to the old destructive "business as usual", especially with respect to logging, grazing, mining, and roading projects. It must be acknowledged that the transition towards ecologically responsible projects being successfully initiated and completed will take time and consistent effort. Indeed, the very ability and credibility of public lands agencies' projects are beyond being "in question", they need to be redeemed. This can only be accomplished with honesty, diligence, adequate funding. and a sincere effort at strict compliance with all necessary guidelines, credible science, environmental policy laws, and the ecological needs of the forests, wildlife, and fisheries. Monitoring and compliance, to be effective, needs to have serious enforceable legal consequences. Repeat violators of project guidelines must not only be stopped, they must also be prohibited from further commercial activities on public lands and be required to provide recompense for the damage they incur. Such provisions need to be included within project proposals.

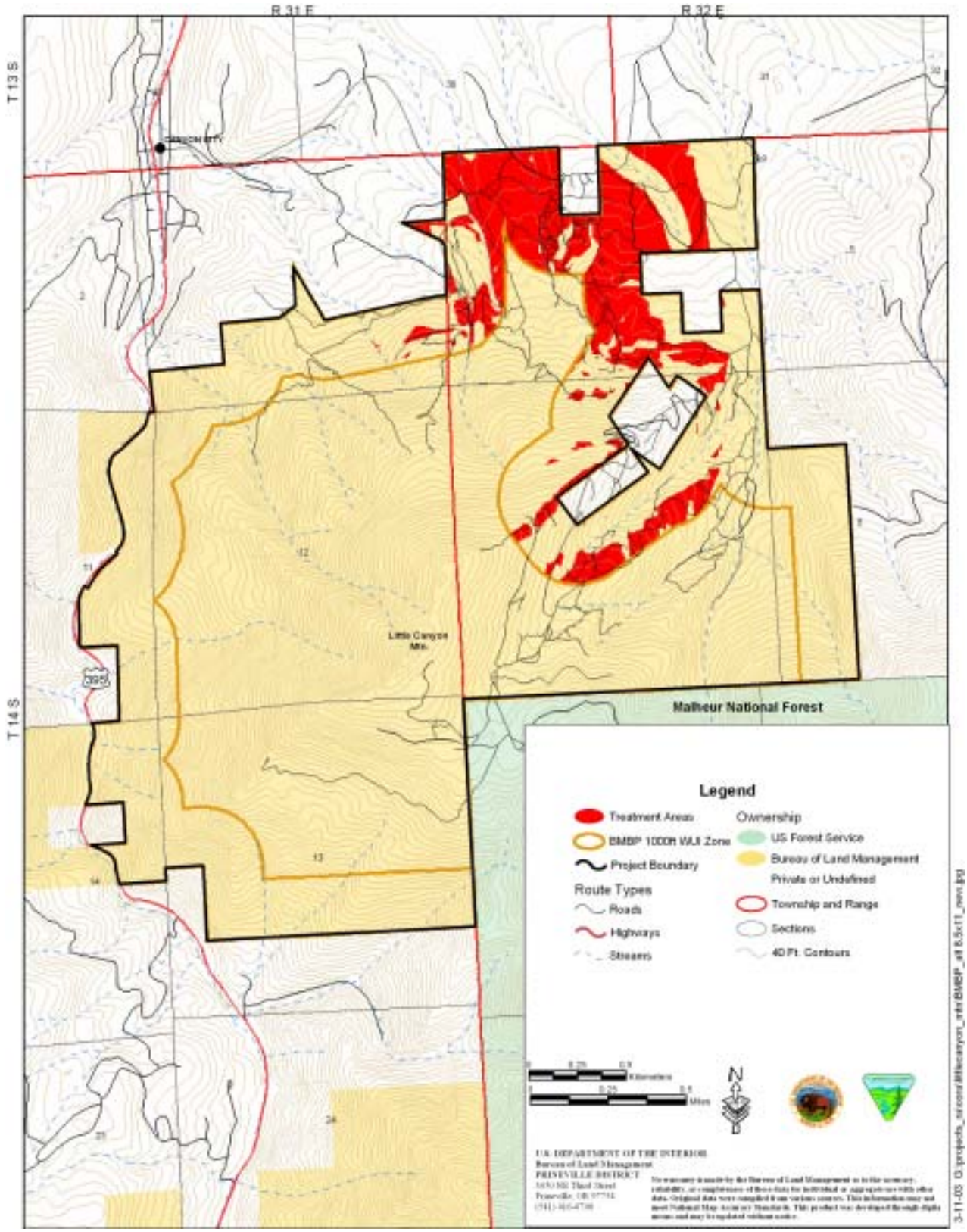
These guidelines are based upon the accompanying scientific research and information, as well as years of biodiversity project survey, observation, and experience. The guidelines were initially published as a draft for public, agency, and conservation community review in October, 2000, and compiled after comments in June, 2002."

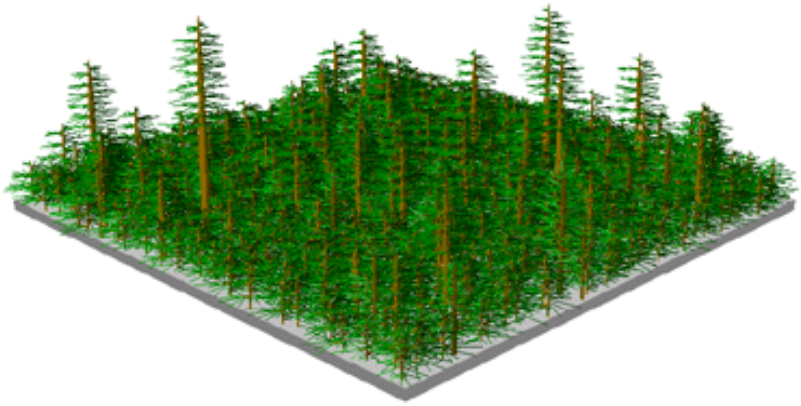
The scientific research referred to is included in its draft form in Appendix B (LOWD 2000).

The effective management area is located primarily in sections 6 and 7 and totals 225 acres after restrictions on slope, PACFISH buffers and non-roaded areas are applied. These 225 acres would be treated as a strict small tree thinning targeting trees less than 12 inches in diameter. Slash would be piled and burned onsite. This alternative would not treat sections 1 or 12 where forest conditions are more threatening to the local urban areas due to their proximity to the denser populations within the city limits of Canyon City, due to the restrictions for slope and non-roaded areas.

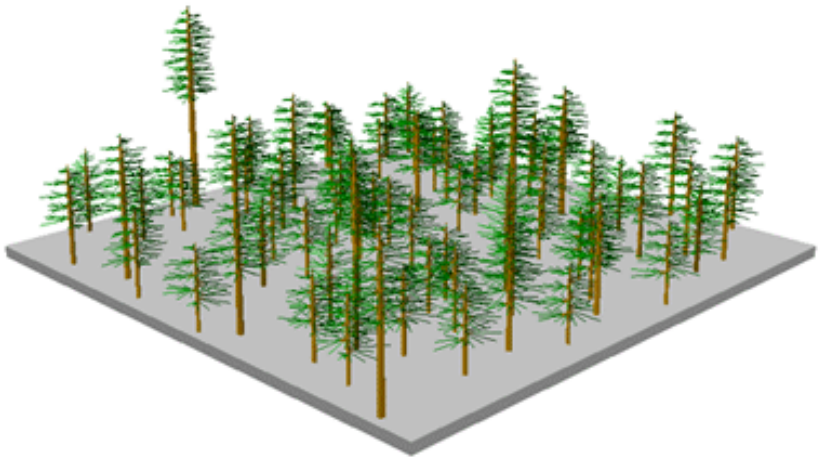
In the proposed treatment areas the average basal area of stands prior to treatment is 142, after treatment the average is 111.

Map 2.1. – Alternative B





Alternative B – Average Stand Conditions Within Treatment Units
Before Treatment – 142 Basal Area, 100% Cover



Alternative B – Average Stand Conditions Within Treatment Units
After Treatment – 111 Basal Area, 54% Cover

2.2.4 Design Criteria Common to Alternatives C Through F

i. Retain snags within the project area to provide habitat for wildlife which utilizes this habitat type.

John Day RMP states, "Leave appropriate snags and/or large dead trees for wildlife, as per current BLM Snag Management Policy Guidelines and Agriculture Handbook No. 553 (USDA 1979).

Rose et al. (2001) emphasize that down wood, snags, and live trees with decay serve vital roles in meeting the life history needs of wildlife species in Oregon and Washington. Interactions among wildlife, other organisms, and decaying wood substrates are essential to ecosystem processes and functions.

Table 2.2. Recommendations for Snag and Down Log Densities for the LCM Project

	Habitat Type			
	Ponderosa Pine Forest and Woodlands		Eastside (Interior) Mixed Conifer Forest	
	10-20 inches DBH	Less than 20 inches DBH	10-20 inches DBH	Greater than 20 inches DBH
# snags / acre	4	1	6	1.5
Linear feet of down logs / acre	144		300	

The recommendations for snag and downed log densities for the Little Canyon Mountain Fuels reduction project is shown in Table 2.2.
Recently, the Decayed Wood Advisor (DecAID) has been released in draft form (Marcot et al. 2002). This work is an advisory tool to help land managers evaluate existing forest conditions and the effects of proposed activities on organisms that use snags and dead wood. Using DecAID, it is possible to relate the abundance of dead wood habitat to the frequency of occurrence of various wildlife species that require dead wood habitat for some part of their life cycle.

ii. Minimize visual contrast as a result of project actions.

Perimeter of treatment areas:
Treatment area perimeters would be carefully blended or feathered, by gradually moving from one thinning rate to another. Treatment area perimeters would be curved with rounded corners, to mimic natural lines in the landscape. Long straight sections and sharp corners would be avoided.

Ridgelines and skylines:
To protect the visual quality of the highly visible northeast-southwest ridgeline, thinning rates would be reduced along the ridge. The goal would be to maintain the appearance of an unbroken line of trees, especially along the southwest portion of the ridge, where individual trees are silhouetted against the skyline.

Insect infested areas:
Healthy trees growing immediately below (in elevation) insect-infested areas would be retained, regardless of species, to provide a screen or visual barrier to an observer located below or level with the infested area. Wherever possible, the perimeter of insect treatment areas would be blended or feathered to lessen the appearance of a hole in the forest canopy. Gradual thinning from the edges toward the center of the infested area is preferable. Dead trees that no longer pose a threat to healthy trees or fire risk would be left standing, to provide some variety in color and texture in the insect treatment areas.

iii. Locate the wildlife cover patches outside of insect infested stands.

Locate the acres reserved for wildlife cover within several patches of healthy non-insect infected areas to minimize the potential for these areas over the UMZ to be infested with insects.

iv. Maintain reduced fire risk level after treatment by utilizing periodic prescribed burning.

Each of these alternatives will prepare the project area for broadcast prescribed burning in order to maintain the decreased fire risk levels achieved through the vegetation treatment. The burning interval will range between the natural burn cycle timeframes of 7 to 25 years. Without periodic prescribed burning additional vegetation treatments would be needed within 30 years.

v. The process for thinning would, in general, be a thin from below to reach the specified target basal area for each alternative treatment.

This thinning would be accomplished in the following manner: 1) Unless otherwise noted all trees would be included in basal area calculations; 2) in alternatives which target particular species, these trees would be removed first. Once basal area targets are achieved thinning would cease. 3) In alternatives that target dead and dying trees, trees of all size classes that are dead or likely to die based on insect infestation level would be removed except for trees needed to meet snag stocking levels. In infested areas the basal area remaining may be lower than the target basal area in order to remove infested trees and reduce the risk of infestation in adjacent un-infested trees. 4) The thin from below would target 90 to 100 percent of trees less than 12 inches DBH, then 80-90 percent of each size class above 12 inches DBH until basal area targets are met.

For example, in an individual unit 90 percent of all trees less than 12 inches DBH would be removed, if basal area target is not achieved then 80 percent of the 12 inch DBH trees would be removed, then 80 percent of the 14 inch DBH trees, then 80 percent of the 16 inch DBH trees, etc. until basal area target is achieved.

This strategy would tend to leave the larger, healthier trees on the site. Leave trees would be marked in the thinning operation starting with the largest, healthiest trees and including progressively smaller trees until the basal area target is reached.

2.2.5 Alternative C - Historic Perspective – circa 1900

The goal of this alternative is to provide a method for meeting all fire hazard reduction needs and improving stand health by considering the historic conditions that existed through the late 1800s as a result of natural regimes and/or Native American influences only. Based on photographic and scientific documentation of the LCM area prior to European settlement, the site most likely had the following conditions:

- A fire return interval less than 25 years (based on fire scar research on dry ponderosa/mixed conifer forests for southern Blue Mountains, Oregon. Heyerdahl and Agee, 1996).
- Ponderosa pine as the dominant vegetation, bordered by grass/shrubs on the lower elevations, and mixed conifer (Douglas-fir (PSME), ponderosa pine (PIPO), etc.) on the upper elevations.
- Very few western juniper and those present were confined to fire-resistant sites such as rocky outcrops
- Diversity within the system, creating a mosaic pattern of habitat and conditions.
- A normal fire return interval that allowed PIPO and PIPO/PSME seedlings to establish and then be thinned/pruned. This was usually accomplished by a series of low-moderate intensity burns that cleared much of the above-ground understory vegetation, thinned clumps of pine/fir seedlings, and maintained healthy spacing (Agee 1993)

Historic photos demonstrate that timbered stands existed primarily on the top and north face of LCM, and in moister drainages. Lower hillsides and ridge-tops resembled grassland/ shrub steppe communities with scattered pine or fir across the landscape. These areas were delineated using a combination of sources including: historic photos, historic survey data, stand exam data, digital orthographic quadrangle maps and aerial photos. From the historic photos and historic surveys, areas with forest stand conditions were delineated on a map of the Little Canyon Mountain area. The stand exam data collected in 2002 was summarized and the units with larger (assumed to be older) trees were delineated. Finally the digital orthographic quadrangle maps and aerial photos were used to delineate areas of thicker forest (i.e. higher canopy closure). Once delineated, units were drawn including these areas; which are taken to be the areas with forest type vegetation as it existed around the turn of the century. The IDT refers to these areas as ‘traditional’ forest areas.

This project would treat the majority of the 2500 acres within the LCM project boundary to varying degrees. In the ‘traditional’ forest areas, on approximately 672 acres, and outside existing PACFISH buffers, stands would be thinned to reduce density. These units would be thinned to a maximum target basal area of 60 - 100 BA

to reduce crown fire risk and be consistent with the UMZ for forest health concerns. Juniper and white-fir would be targeted as these two species are not represented in the historic condition to the degree they occur on the mountain now. A small buffer approximately 100 – 250 feet would be left untreated around the area known as the "pit" to provide a line-of-site barrier and maintain the ability to use vegetation for future management such as trail designation and closure. In addition approximately 210 acres will be thinned to a target basal area of 100-150 rationale which is less dense than existing forest conditions to increase tree vigor while providing niche and pocket habitat for various wildlife species.

The understory vegetation in the 'traditional' forest areas would be piled and burned, and the site would be set for future prescribed burn entries within the natural fire interval cycle of 7 to 25 years. In addition, to prevent the establishment of weeds, these units may need to be seeded and/or planted (shrubs) after the burn if adequate seed source is not present.

The following photos taken at the turn of the century and in 2002 from relatively the same location show the contrast in conditions between present and historic (circa 1900).

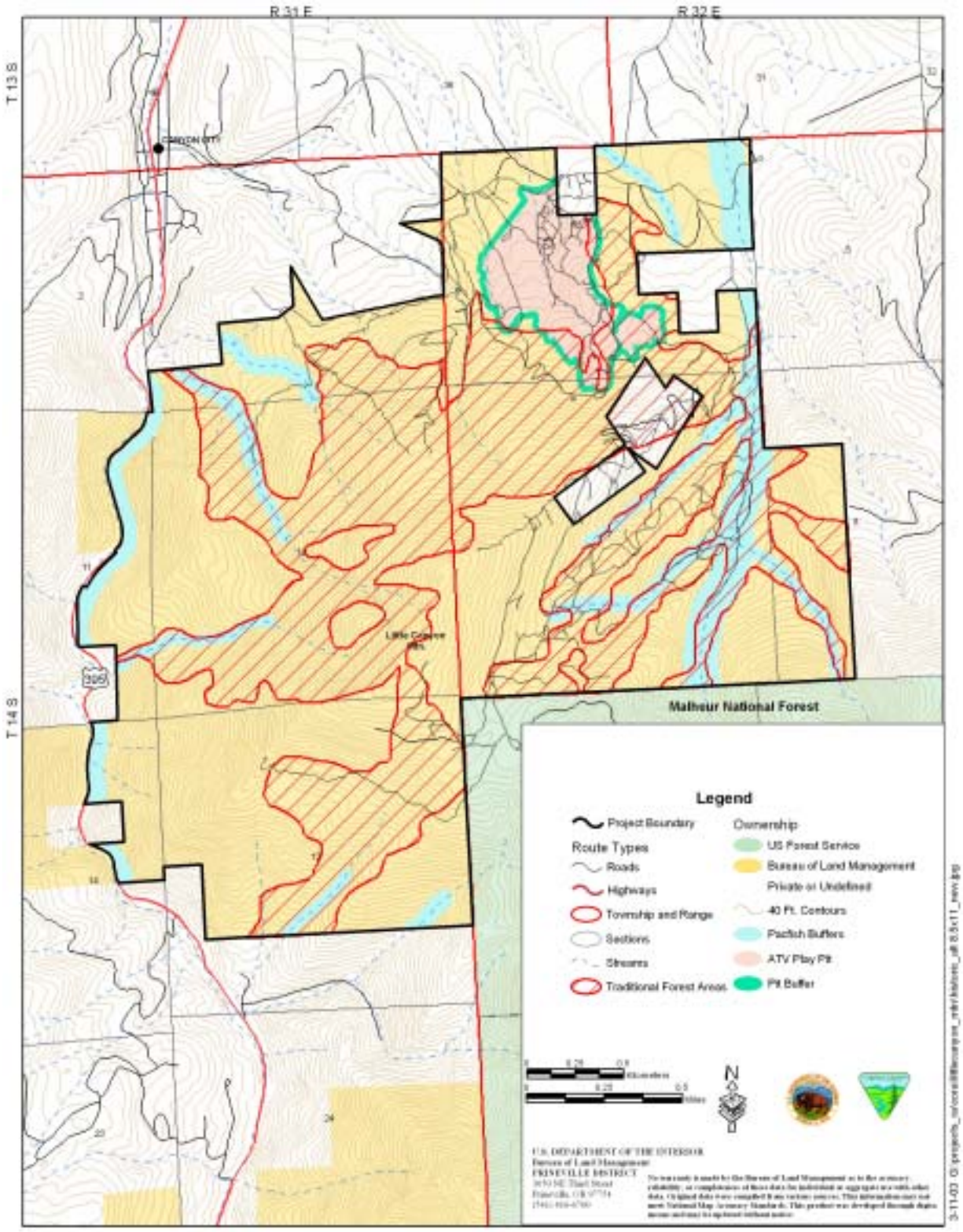
Canyon Mountain 1898-1904. Photo obtained from Grant County Historical Museum – Canyon City, Oregon.

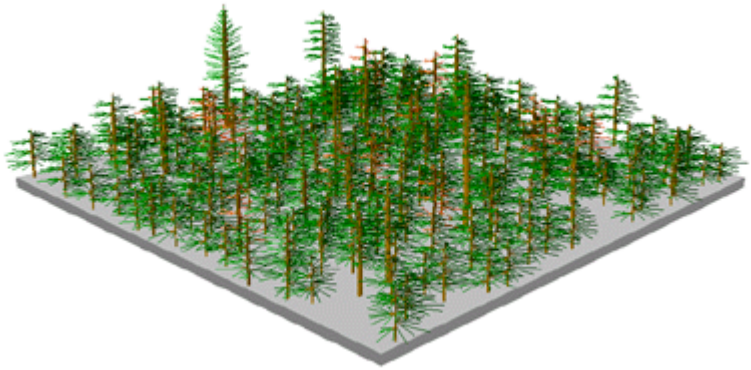
Canyon Mountain in October 2002.

Outside the 'traditional' forest areas, approximately 1202 acres would be treated to move the area toward pre-European settlement conditions. In these units, all trees would be removed down to a maximum target basal area range of 30-50 BA beginning with juniper and moving into the conifer species. Historically these areas had fewer trees than the 'traditional' forest areas, treatment at the 30-50 BA level would reduce crown fire risk and leave these stands in a more open condition when compared to the 'traditional' forest areas. In order to avoid a stark contrast, some gradation between the 'traditional' forest areas and the open areas would occur. Tree removal would be done using ground based logging (287 acres) and aerial logging (596 acres). On slopes greater than 35 percent, an aerial yarding system capable of full suspension of logs would be required. On slopes less than 35 percent, yarding would be accomplished by a ground based yarding system capable of one end log suspension. The project area would be whole-tree logged for commercial trees (greater than 7 inches diameter) and trees with less than commercial value would be cut and piled for burning or removal.

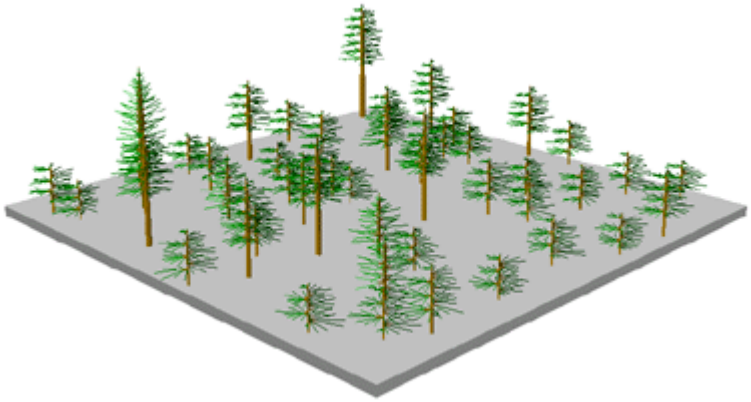
In addition, curl-leaf mountain mahogany (CMM) would be thinned from the majority of the units. This shrub was not common in the mid-1800s, and shrubs that were present were healthier than the stands present on LCM today. Individual shrubs in the eastern portion of the project area would be untreated until the area is burned through prescription in the future. Dense, decadent stands on the top of LCM and on the western slopes would be thinned to reduce the continuous fuel loads. Western juniper would also be targeted for removal from the project area since it was minimally present in the late 1800s. Larger juniper, found on rockier, fire-resistant sites would be retained, with all other juniper cut and removed, or piled for burning.

Map 2.2 – Alternative C

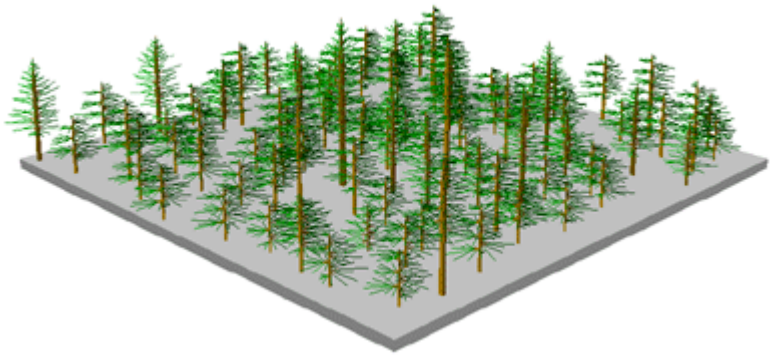




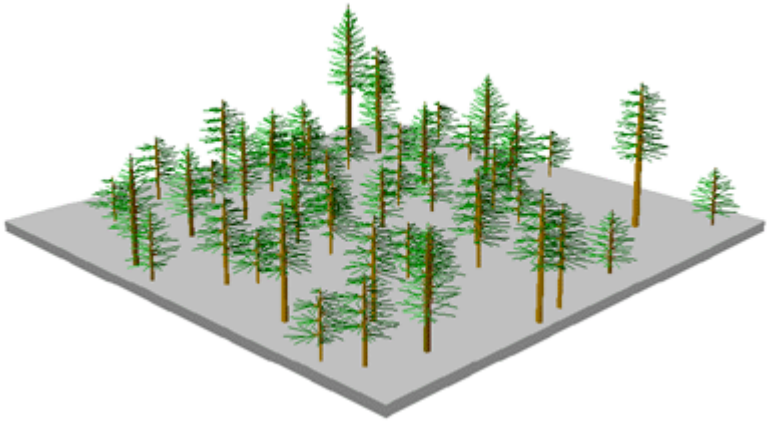
Alternative C – Average Stand Conditions in 30-50 Basal Area Treatment Units Before Treatment – 82 Basal Area, 94% Cover



Alternative C – Average Stand Conditions in 30-50 Basal Area Treatment Units After Treatment – 35 Basal Area, 33% Cover



Alternative C – Average Stand Conditions in 60-100 Basal Area Treatment Units Before Treatment – 74 Basal Area, 62% Cover



Alternative C – Average Stand Conditions in 60-100 Basal Area Treatment Units After Treatment – 57 Basal Area, 38% Cover

2.2.6 Alternative D - Uniform Basal Treatment and Riparian Enhancement

The goal of this alternative is to provide a method for meeting all fire hazard reduction needs and improving stand health by considering the need presented in the Central Oregon Fire Management Services' Fire Management Plan (2002) to reduce fuel loads on Little Canyon Mountain as part of the Wildland-Urban Interface zone surrounding Canyon City. This alternative would treat the entire mountain according to the fuel break recommendation for stands near or adjacent to the Wildland-Urban Interface zone of 1.5 miles. Due to the small size of the project area and the scattered mining related structures on the mountain, this distance encompasses all the BLM managed lands on Little Canyon Mountain and defines the proposed treatment area. As a result, the entire area would be treated to maximum target basal area of 40-60 BA (Lane 2002). The project area would be thinned to reach the specified basal area (juniper greater than 20 inches DBH would be retained). All tree species would be included in basal area targets. This basal area target would be on the low end of the recommended basal area for reducing crown fire potential and therefore would eliminate the need for additional mechanical fuels treatments for a period of up to roughly 30 years.

Tree removal would be done using ground based logging (701 acres) and aerial logging (1390 acres). On slopes greater than 35 percent, an aerial yarding system capable of full suspension of logs would be required. On slopes less than 35 percent, yarding would be accomplished by a ground based yarding system capable of one end log suspension. The project area would be whole-tree logged for commercial trees (greater than 7 inches diameter) and trees with less than commercial value would be cut and piled for burning or removal.

A total of 10 acres of riparian overstory removal would occur in selected areas along Little Pine Creek to open the forest canopy and release suppressed understory hardwoods. A culvert which acts as a fish barrier on a road easement would be replaced or the stream channel re-contoured to provide passage for fish. The main road from the county road to the National Forest Trailhead would be upgraded and improved to reduce erosion and sedimentation concerns along its length. This action would involve re-routing portions of the existing road. Realignment would occur on approximately 0.5 miles of road in conjunction with obliterating approximately 0.15 miles of road within Riparian Habitat Conservation Areas along Little Pine Creek.

Thirty-three roads segments have been considered for closure and obliteration in order to reduce sedimentation and erosion impacts to the stream from these roads (See Map 2.4).

Approximately 1.0 miles of new fence would be constructed along the BLM boundary near Little Pine Creek to eliminate livestock access from the BLM portions of Little Pine Creek.

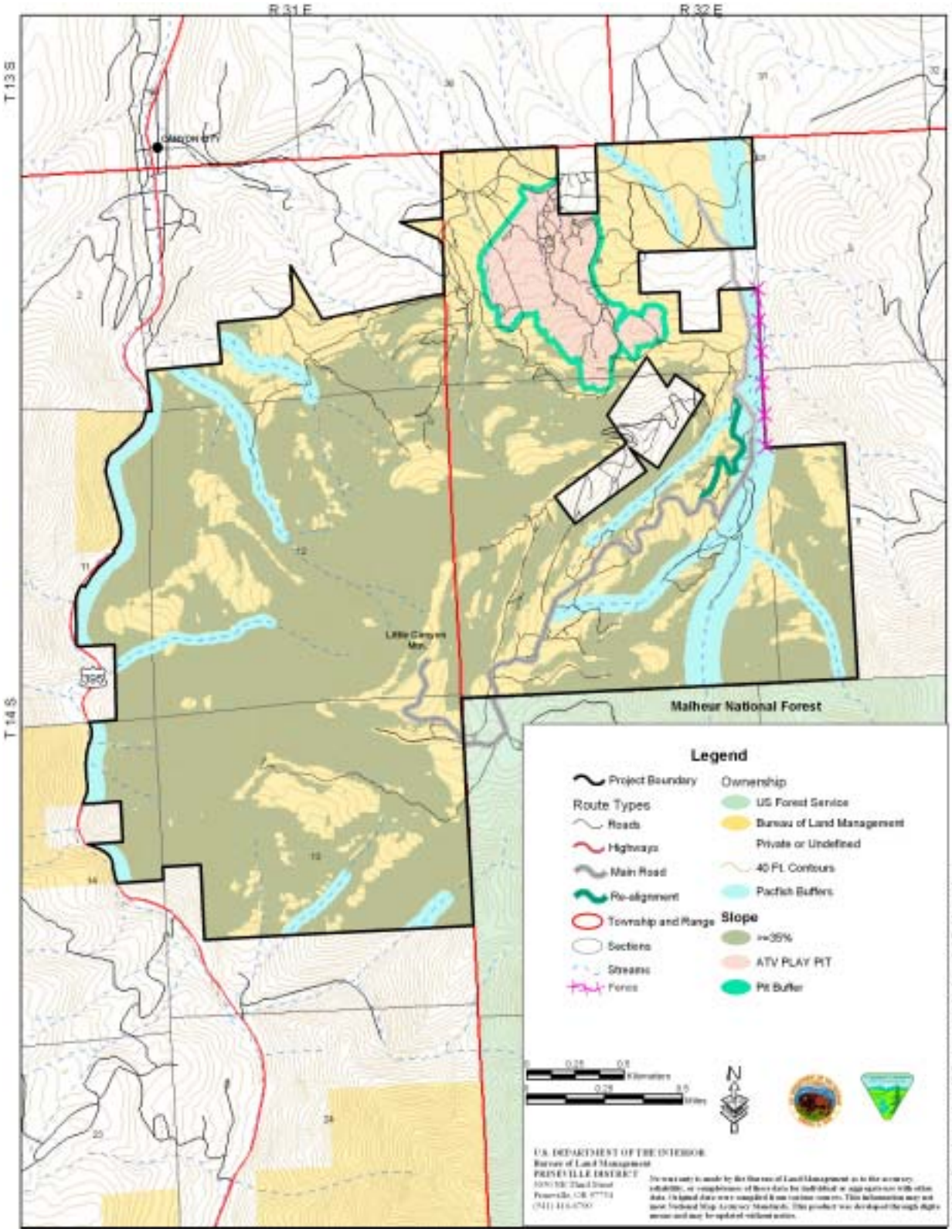
The 'pit' area would be closed at the county road entrance to vehicles over 50 inches in width to discourage garbage dumping within the 'pit' area while still accommodating

motorcycle and off-highway vehicle (OHV) use. A parking area would remain at the entrance. The 'pit' would also be buffered by a 100-250 foot non-treatment area to provide a line-of-site barrier and maintain the ability to use vegetation for future management such as trail designation and closure.

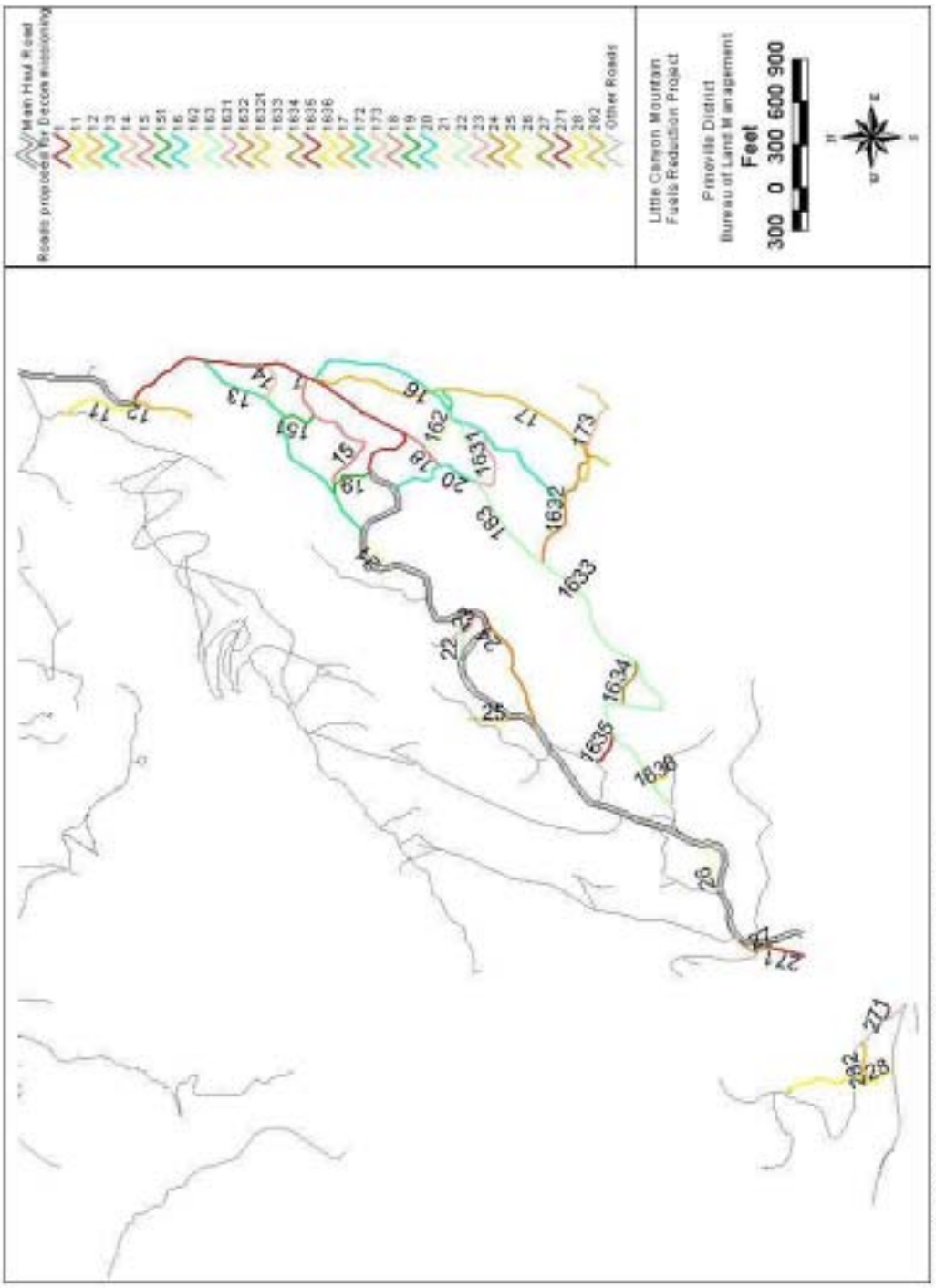
The average basal area within stands within the project area before treatment is 95.8, after treatment the average will be 50.

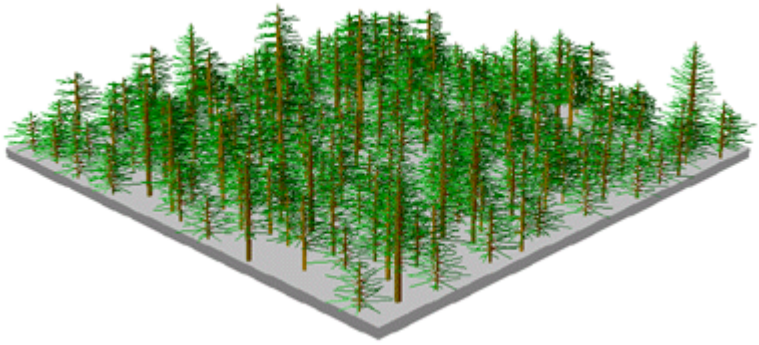
The project area will be set for subsequent prescribed burning in future years to maintain stand conditions.

Map 2.3 – Alternative D

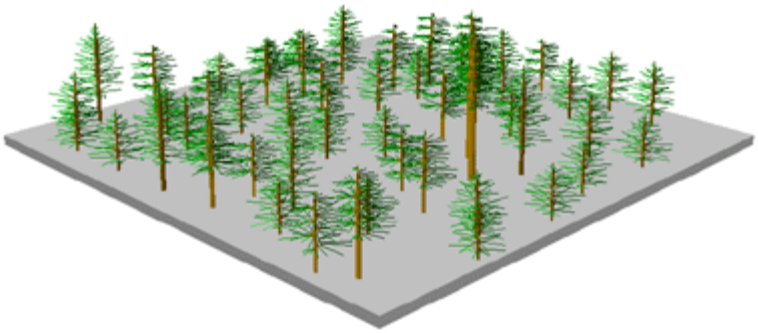


Map 2.4 - Roads Proposed for Closure

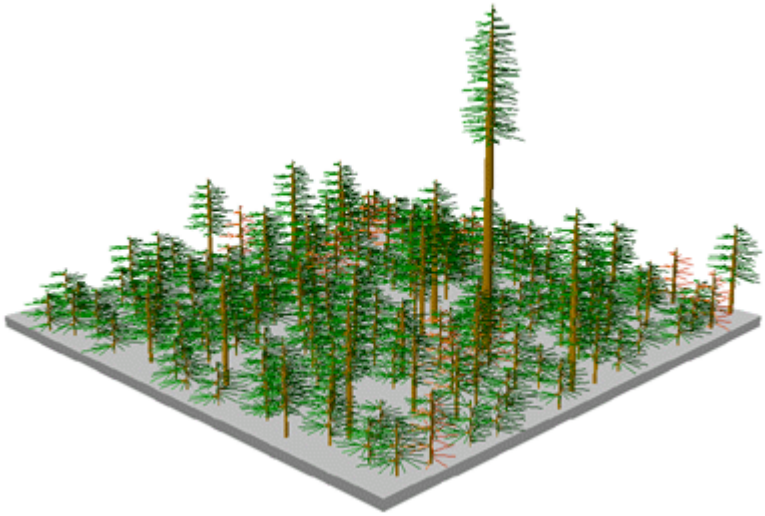




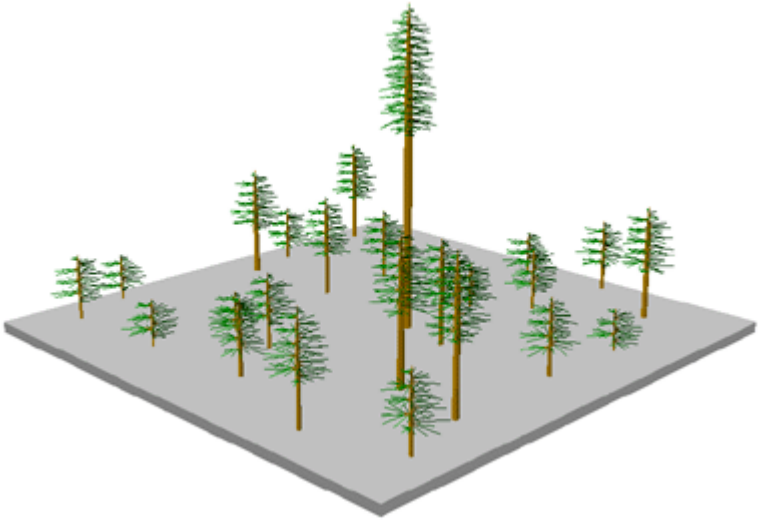
Alternative D North – Average Stand Conditions Within Treatment Units
Before Treatment – 111 Basal Area, 96% Cover



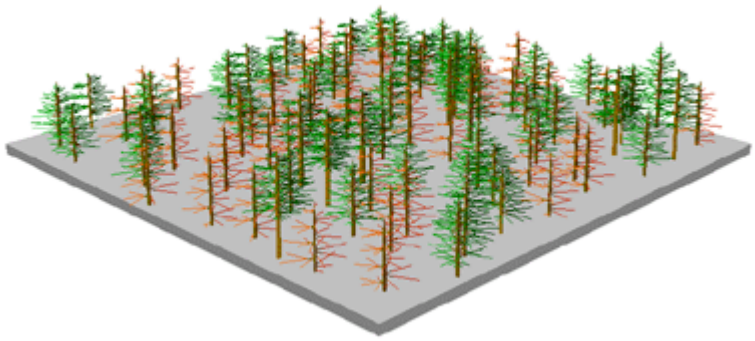
Alternative D North – Average Stand Conditions Within Treatment Units
After Treatment – 45 Basal Area, 43% Cover



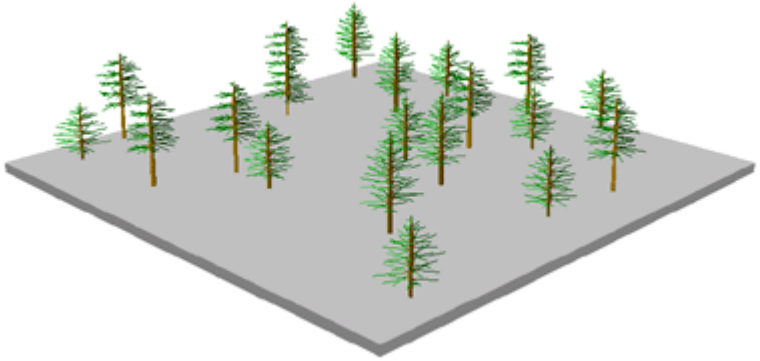
Alternative D East – Average Stand Conditions Within Treatment Units
Before Treatment – 77 Basal Area, 90% Cover



Alternative D East – Average Stand Conditions Within Treatment Units
After Treatment – 40 Basal Area, 15% Cover



Alternative D West – Average Stand Conditions Within Treatment Units
Before Treatment – 73 Basal Area, 59% Cover



Alternative D West – Average Stand Conditions Within Treatment Units
After Treatment – 26 Basal Area, 13% Cover

2.2.7 Alternative E - Graded Basal Treatment

The goal of this alternative is to provide a method for meeting all fire hazard reduction needs and improving stand health using a graded basal target beginning around 40 BA at the base of the mountain and increasing to roughly 100 BA at the top of the mountain. This design provides decreasing crown fire risk from the top of the mountain towards town which would improve the likelihood of halting fire spread within the WUI. Within and adjacent to the wildland-urban interface area the maximum basal area target would be 40-50 BA, and target maximum basal areas would increase gradually in ¼ mile wide bands as treatment progressed upslope to a maximum basal area target of 90 - 100 BA. The project area will be broken into four bands or levels:

Level 1 - thin to 40-50 BA, approximately 983 acres.
Level 2 - thin to 50-70 BA, approximately 560 acres.
Level 3 - thin to 70-90 BA, approximately 397 acres.
Level 4 - thin to 90-100 BA, approximately 256 acres.

Treatment in all units would initially remove dead/dying, beetle infested trees, and then would thin from below to meet target basal areas. Thinning would include juniper in the total basal area calculations. Leave trees would maintain the pre-treatment proportion of pine, fir, juniper and hardwood species.

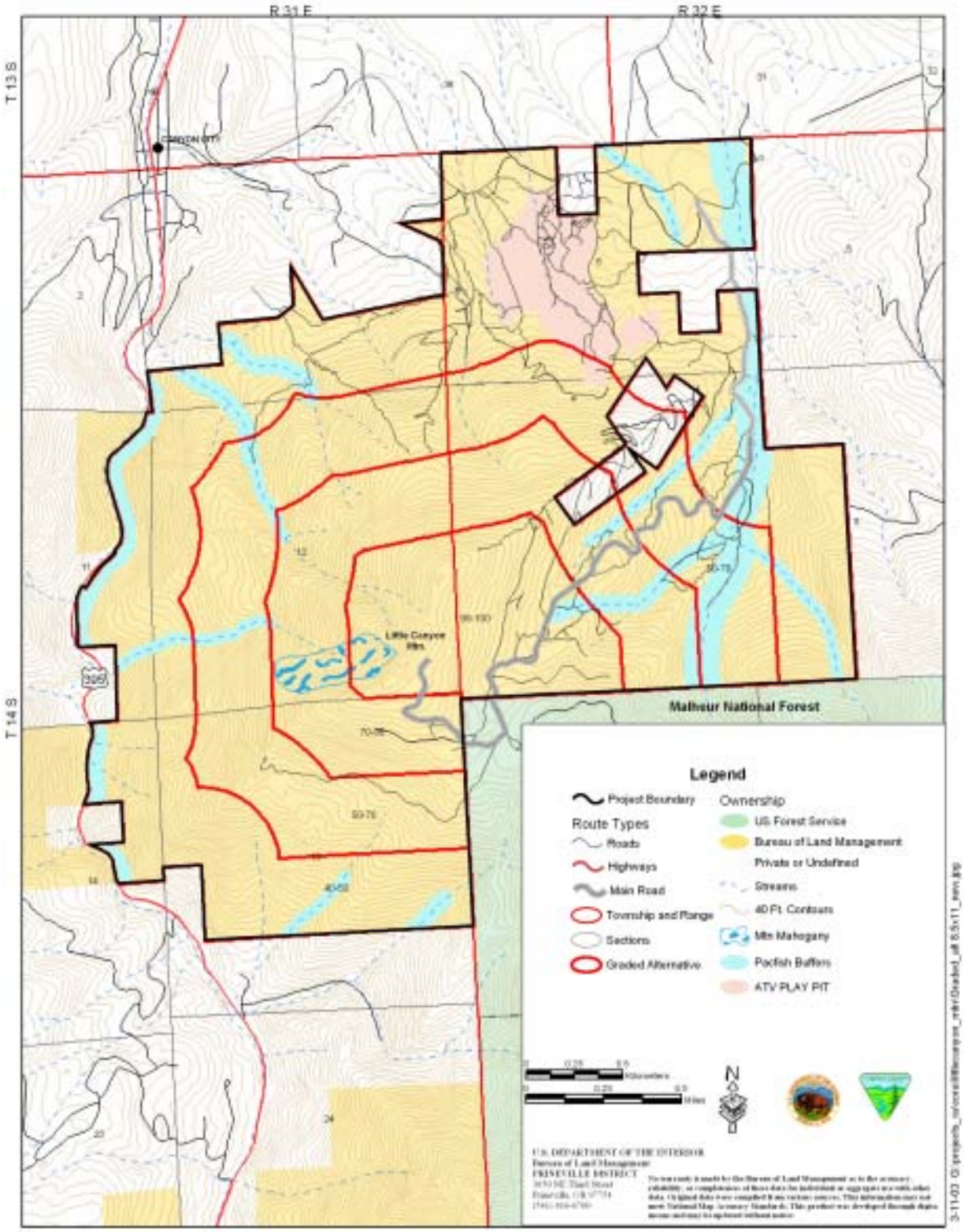
As a result of vegetation treatment, a fuel break would be constructed approximately 0.25 miles wide adjacent to the wildland-urban interface boundary along the west, north and the majority of the east slopes, with the east side extending south and tying into the existing burned areas. This section would be the low-end of the graded basal area target and stands would become more dense the higher the elevation on LCM. The understory vegetation would be piled for burning or removal, and the site would be set for future prescribed burn entries within the natural fire interval cycle of seven to 25 years.

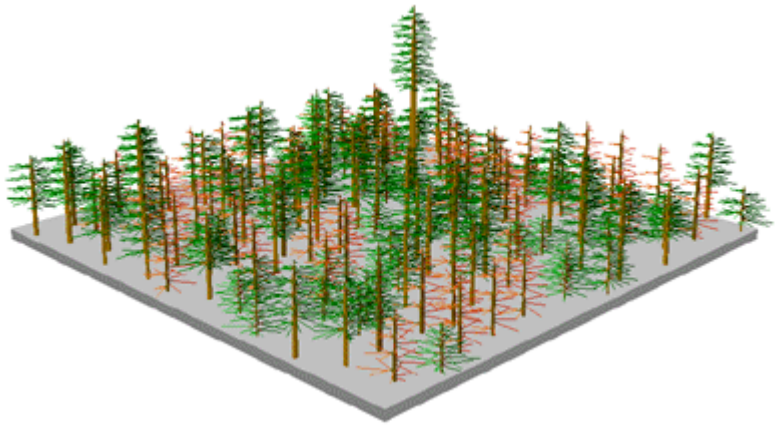
Tree removal would be done using ground based logging (787 acres) and aerial logging (1409 acres). On slopes greater than 35 percent, an aerial yarding system capable of full suspension of logs would be required. On slopes less than 35 percent, yarding would be accomplished by a ground based yarding system capable of one end log suspension.

In this alternative, curl-leaf mountain mahogany (CMM) would be pruned in the Whisky Gulch area at the top of LCM to stimulate growth. This area currently demonstrates a small amount of CMM regeneration, and maintaining a canopy of mature CMM for protection would increase survivorship of seedling CMM. In addition, all pruned material would be left in place to provide protection for seedling CMM. Mahogany on the east slope is not demonstrating any regeneration, very little biomass production, and is too tall and decadent to serve as wildlife forage. These stands would be thinned and pile-burned to reduce continuous fuel loads. Where possible, ground would be disturbed (scarified) around and under CMM to promote regeneration.

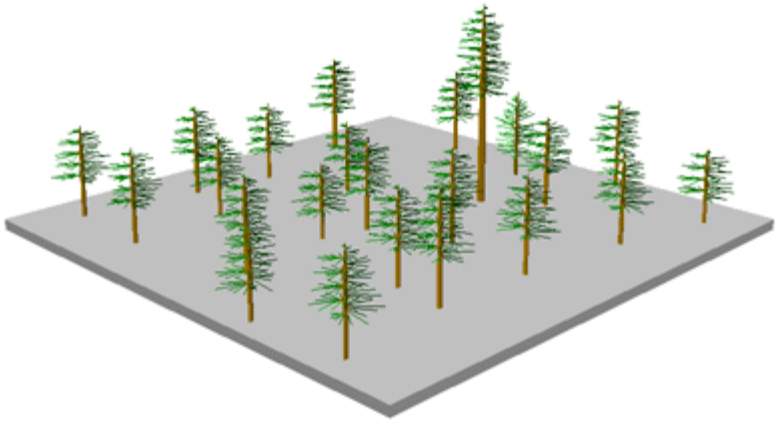
The main access road would be hydrologically improved from its junction with the county road to the north, south to the forest boundary, approximately 2.87 miles. Improvement would include rocking, culverts, dips and other hydrologic aides to reduce sediment and improve runoff.

Map 2.5 – Alternative E

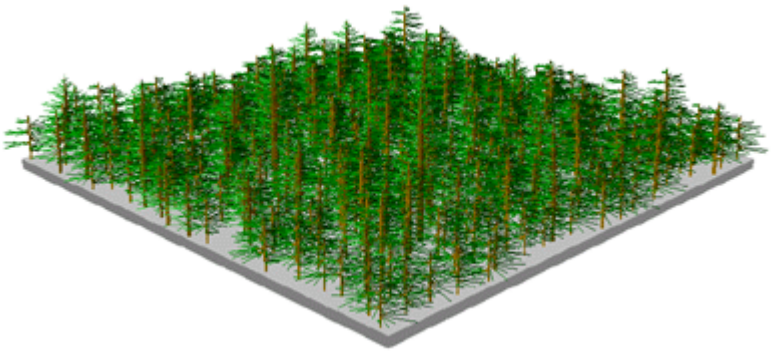




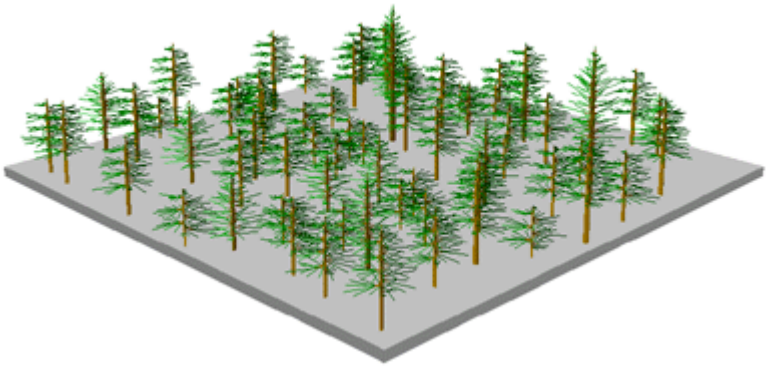
Alternative E – Average Stand Conditions in 40-50 Basal Area Treatment Units – Level 1
Before Treatment – 130 Basal Area, 84% Cover



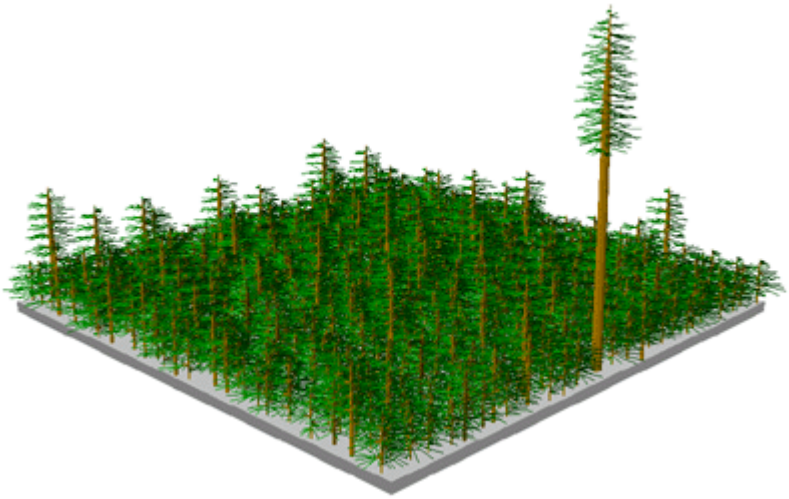
Alternative E – Average Stand Conditions in 40-50 Basal Area Treatment Units – Level 1
After Treatment – 42 Basal Area, 16% Cover



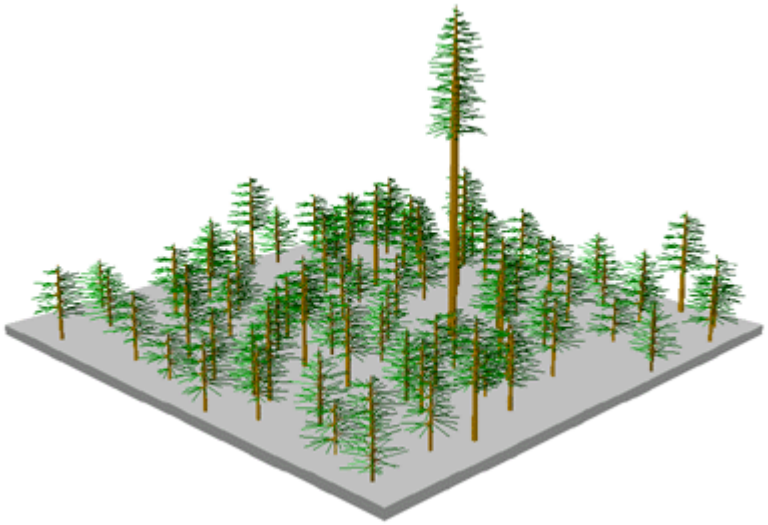
Alternative E – Average Stand Conditions in 50-70 Basal Area Treatment Units – Level 2
Before Treatment – 164 Basal Area, 100% Cover



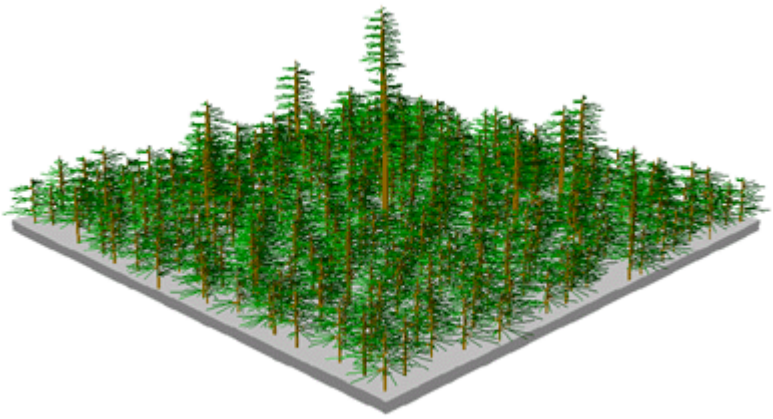
Alternative E – Average Stand Conditions in 50-70 Basal Area Treatment Units – Level 2
After Treatment – 60 Basal Area, 48% Cover



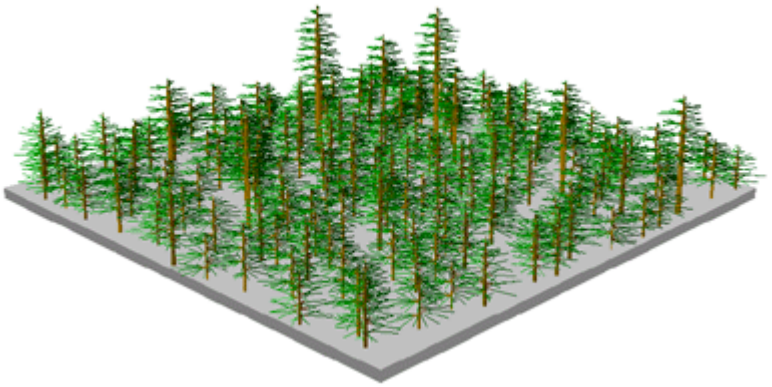
Alternative E – Average Stand Conditions in 70-90 Basal Area Treatment Units – Level 3
Before Treatment – 164 Basal Area, 100% Cover



Alternative E – Average Stand Conditions in 70-90 Basal Area Treatment Units – Level 3
After Treatment – 77 Basal Area, 55% Cover



Alternative E – Average Stand Conditions in 90-100 Basal Area Treatment Units – Level 4
Before Treatment – 107 Basal Area, 99% Cover



Alternative E – Average Stand Conditions in 90-100 Basal Area Treatment Units – Level 4
After Treatment – 80 Basal Area, 88% Cover

2.2.8 Alternative F - Stand Condition Stratified Treatment

The goal of this alternative is to provide a method for meeting all fire hazard reduction needs and improving stand health by considering the need for post-treatment stand diversity. Similar stands would be identified based on species composition characteristics. Stands would be treated according to specific prescriptions. Target maximum basal area would range from:

0 – 40 BA in the juniper dominated stands, approximately 352 acres
40 – 60 BA in the ponderosa pine dominated stands, approximately 883 acres
60 – 80 BA in the mixed conifer (ponderosa/Douglas-fir) dominated stands, approximately 315 acres
80 – 100 BA in the Douglas-fir dominated stands, approximately 300 acres

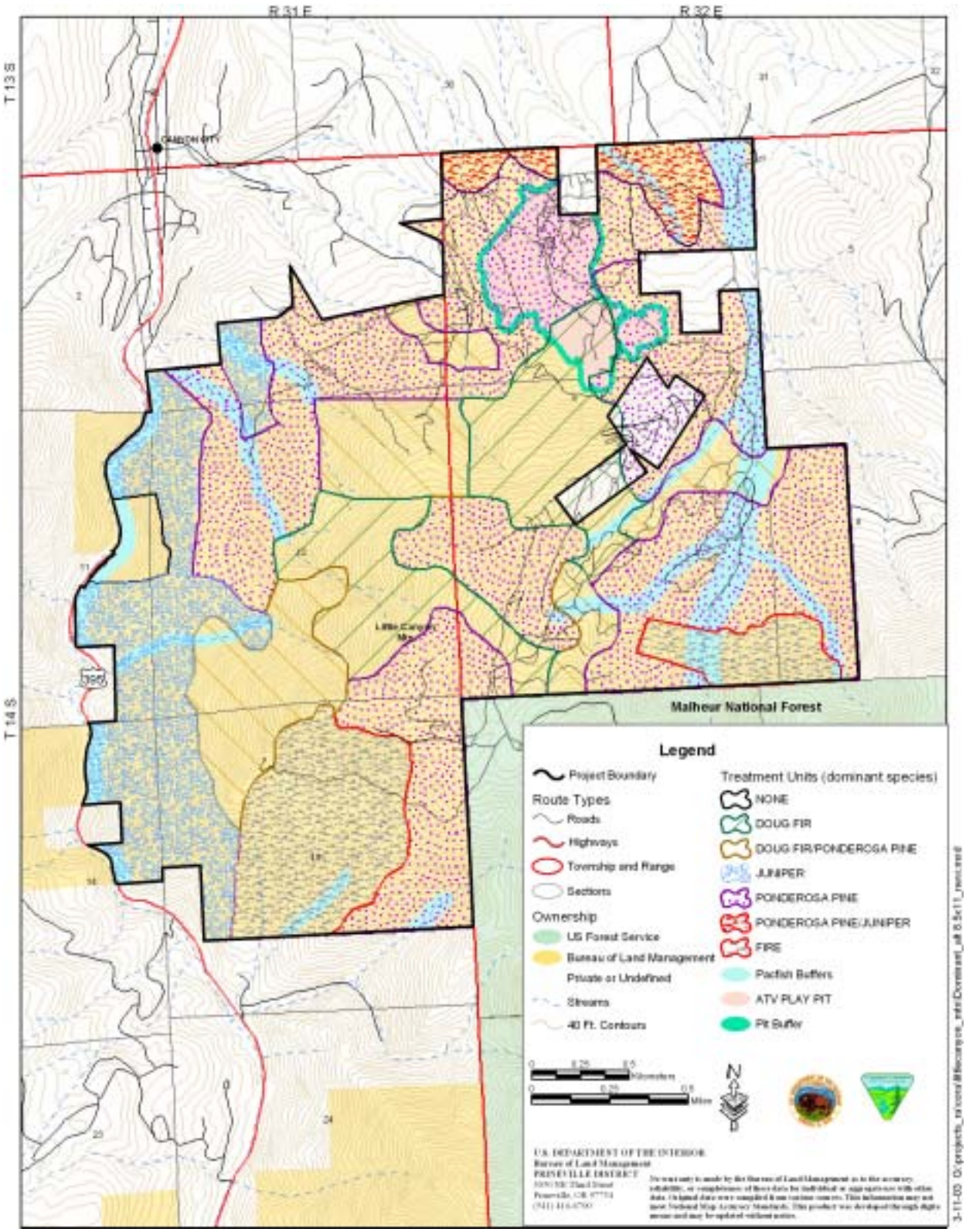
Rather than a strict basal area goal, target basal areas would be more flexible to reflect individual stand compositions. Wildlife hiding cover, in the form of small "thickets" would be retained in conifer units (approximately 185 acres). In addition, in the event that thinning does not reduce beetle –kill to normal levels, a re-entry to remove additional dead/dying trees would be planned only if the number of dead trees poses a considerable fuel risk, otherwise dead and dying trees would become snags for use by wildlife.

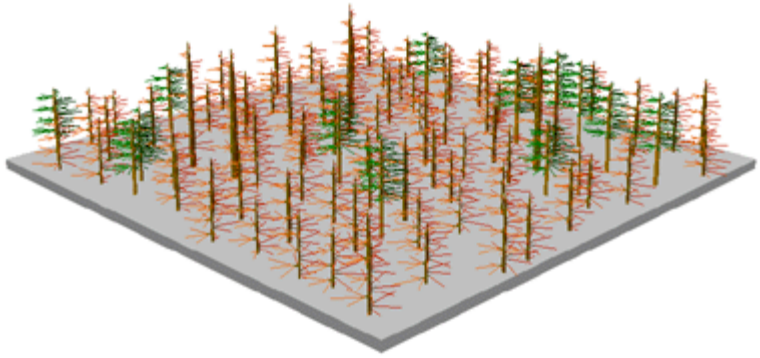
Treatment would target dead/dying beetle infested trees and then juniper, followed by a thin to meet target basal areas. Leave trees would maintain the pre-treatment proportion of pine, fir and hardwood species. Western juniper would also be targeted for removal from the project area since it was minimally present in the late 1800s. Larger juniper (over 20 inches DBH) and those found on rockier, fire-resistant sites would be retained, with all other juniper cut and removed, or piled for burning. Tree removal would be done using ground based yarding (619 acres) and aerial based yarding (1231 acres). On slopes greater than 35 percent, an aerial yarding system capable of full suspension of logs would be required. On slopes less than 35 percent, yarding would be accomplished by a ground based yarding system capable of one end log suspension. Whole-tree logging practices would be implemented, with trees less than 7 inches diameter piled for burning.

The 'pit' area would be closed at the county road entrance to vehicles over 50 inches in width to discourage garbage dumping within the 'pit' area while still accommodating motorcycle and off-highway vehicle (OHV) use. A parking area would remain at the entrance. The 'pit' would also be buffered by a 100-250 foot non-treatment area to provide a line-of-site barrier and maintain the ability to use vegetation for future management such as trail designation and closure.

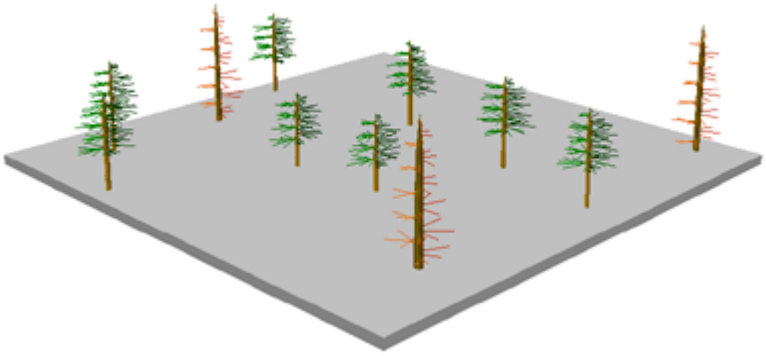
Curl-leaf mountain mahogany (CMM) would be thinned from the majority of the units. This shrub was not common in the mid-1800s, and shrubs that were present were healthier than the stands present on LCM today. Individual shrubs in the eastern portion of the project area would be untreated until the area is burned through prescription in the future. Dense, decadent stands on the top of LCM and on the western slopes would be thinned to reduce the continuous fuel loads.

Map 2.6 – Alternative F

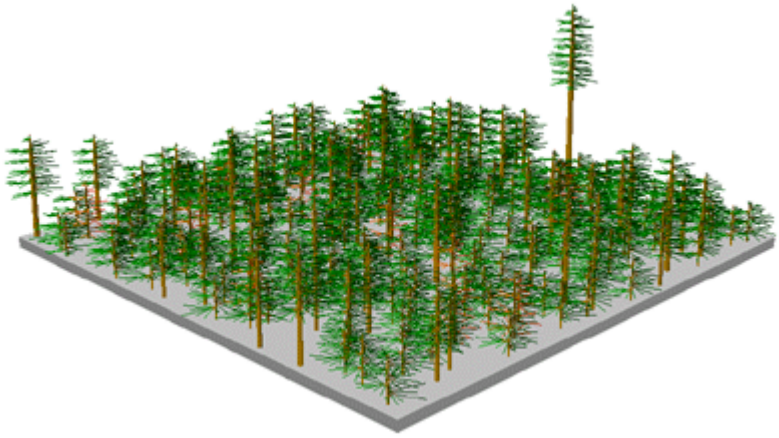




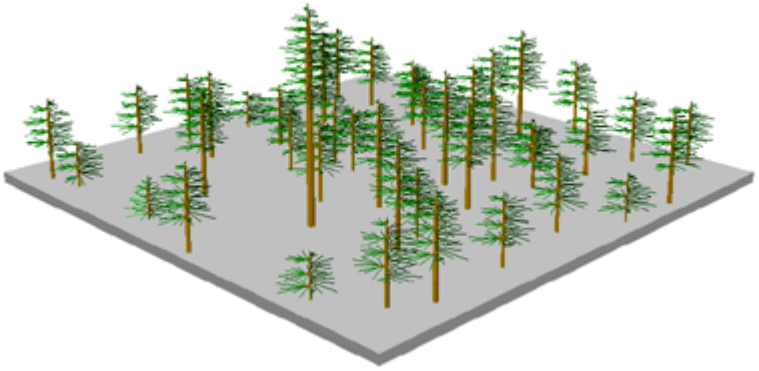
Alternative F Juniper – Average Stand Conditions Within Treatment Units
Before Treatment – 84 Basal Area, 65% Cover



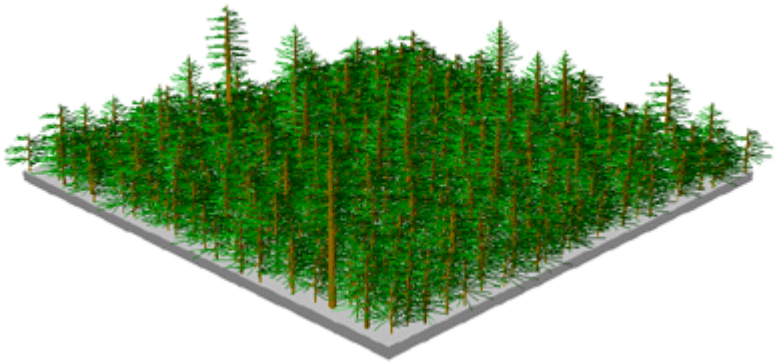
Alternative F Juniper– Average Stand Conditions Within Treatment Units
After Treatment – 27 Basal Area, 6% Cover



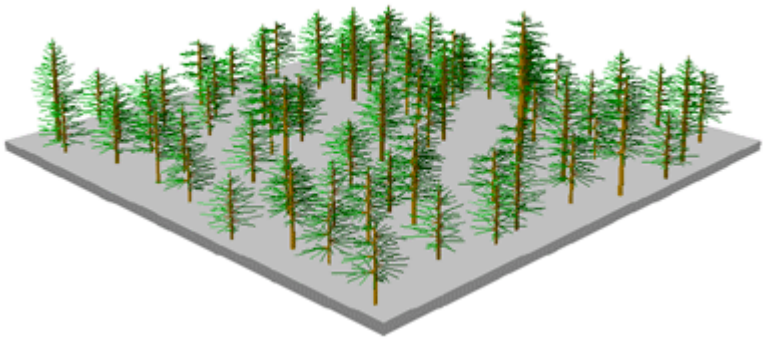
Alternative F Ponderosa – Average Stand Conditions Within Treatment Units
Before Treatment – 113 Basal Area, 95% Cover



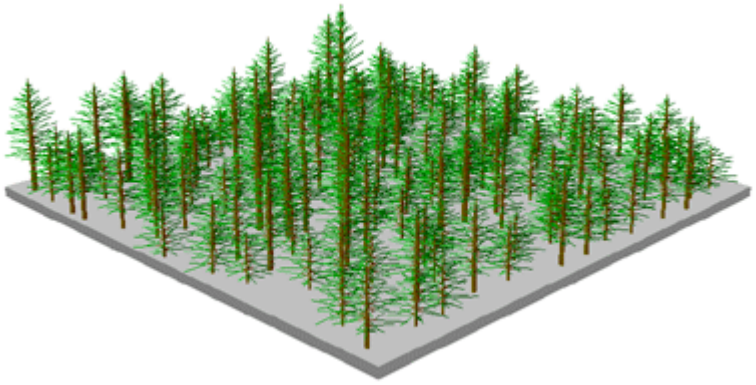
Alternative F Ponderosa – Average Stand Conditions Within Treatment Units
After Treatment – 55 Basal Area, 31% Cover



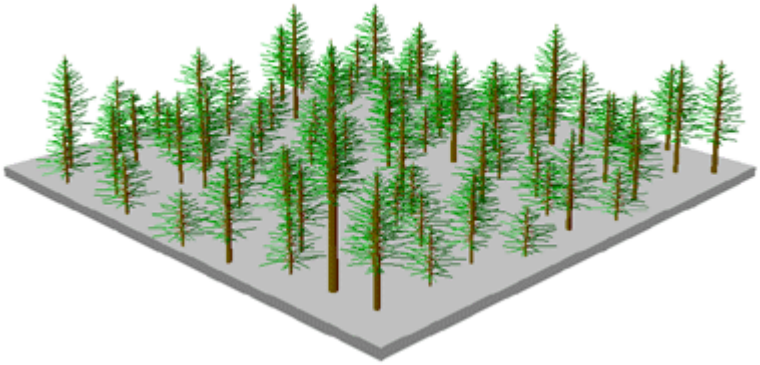
Alternative F Mixed – Average Stand Conditions Within Treatment Units
Before Treatment – 167 Basal Area, 100% Cover



Alternative F Mixed – Average Stand Conditions Within Treatment Units
After Treatment – 67 Basal Area, 54% Cover



Alternative F Douglas – Average Stand Conditions Within Treatment Units
Before Treatment – 133 Basal Area, 79% Cover



Alternative F Douglas – Average Stand Conditions Within Treatment Units
After Treatment – 85 Basal Area, 56% Cover

2.2.9 Summary of Alternatives

Table 2.3	Alternatives					
Actions	**(A) No Action**	**(B) BMBP**	**(C) Historic**	**(D) Uniform**	**(E) Graded**	**(F) Stratified**
Acres Treated	70 acres	225 acres	2084 acres	2091 acres	2196 acres	1850 acres
>=35% Slope	1534 acres	0 acres	1369 acres	1390 acres	1409 acres	1231 acres
<35% Slope	934 acres	225 acres	716 acres	701 acres	787 acres	619 acres
Basal Area 0-40	486 acres	0 acres	0 acres	0 acres	0 acres	352 acres
Basal Area 30-50	335 acres	0 acres	1202 acres	0 acres	0 acres	0 acres
Basal Area 40-50	50 acres	0 acres	0 acres	0 acres	983 acres	0 acres
Basal Area 40-60	251 acres	0 acres	0 acres	2091 acres	0 acres	823 acres
Basal Area 50-70	301 acres	0 acres	0 acres	0 acres	560 acres	0 acres
Basal Area 60-80	168 acres	0 acres	0 acres	0 acres	0 acres	255 acres
Basal Area 60-100	520 acres	0 acres	672 acres	0 acres	0 acres	0 acres
Basal Area 70-90	285 acres	0 acres	0 acres	0 acres	397 acres	0 acres
Basal Area 80-100	352 acres	0 acres	0 acres	0 acres	0 acres	235 acres
Basal Area 90-100	134 acres	0 acres	0 acres	0 acres	256 acres	0 acres
Basal Area 100-150	771 acres	225 acres	210 acres	0 acres	0 acres	185 acres
Basal Area 150+	469 acres	0 acres	0 acres	0 acres	0 acres	0 acres
Mechanical Re-Entry	0-5 yrs	5-10 yrs	10-30 yrs	30 yrs	20-30 yrs	10-30 yrs
Target Dead and Dying	No	No	No	No	Yes	Yes
Target Juniper	No	No	Yes	No	No	Yes
Road Reconstruction	No	No	No	0.5 miles	0 miles	No
Road Closures	No	No	No	5.0 miles	No	No
Road Improvements	No	No	No	2.72 miles	2.87 miles	No
Culvert Replaced	No	No	No	Yes	No	No
Riparian Treatments	No	No	No	10 acres	No	No
Mahogany Treatment	No	No	Yes	No	26 acres	26+ Acres
Fence Construction	No	No	No	1.0 mile	No	No
Pit Buffered	No	No	Yes	Yes	No	Yes
Pit Closed	No	No	No	Yes	No	Yes

2.3 Range of Alternatives

2.3.1 Development of Alternatives

The alternatives described in this document were developed in response to project initiation and description of the Purpose and Need for the project. With feedback from initial public scoping and involvement of the team in data collection the IDT began developing a range of alternatives to meet the purpose and need for the project.

Alternative B originated directly from public scoping. It is based on input received from the Blue Mountain Biodiversity Project. This alternative attempts to meet the purpose and need without the use of heavy equipment or any commercial tree removal. It focuses on minimal human intervention to the vegetation component and then only on flatter (less than 30 percent slopes). The IDT kept this alternative intact, several interpretations were necessary in order to analyze and describe the alternative, but again these were minimal so as to keep the intent of the alternative pure. This alternative uses the first approach as described in Section 2.1.

Alternatives C through F were developed by the IDT utilizing different avenues for achieving the purpose and need. These alternatives use the third approach as described in Section 2.1. The vegetation treatments described by these five alternatives present a broad range of alternatives for treatment of the area.

Alternative C through F also contain various other actions to different extents – mahogany treatments, dead and dying tree removal, juniper retention, vehicle and road closures, riparian treatments and road improvements. These actions have been analyzed and describe a complete picture of possible actions in the area.

While impossible to display and analyze every conceivable scenario within the project area, the alternatives as described do show a reasonable range of potential alternatives for this project area.

2.3.2 Alternatives Considered but Eliminated from Analysis

- √ Overstory Removal and Commercial Thin – would not meet Purpose and Need because it:
  - o Would not reduce fuel loads sufficiently to reduce crown fire or extreme fire behavior. The majority of stands are extremely overstocked, and removing the overstory would still leave dense “dog-hair” thickets over much of the project area.
  - o Would remove much of the dead and dying, but would not reduce understory densities in a manner that would improve future forest health. While the immediate beetle-kill problem would be reduced, stands would continue to be overstocked and susceptible to future infestation
  - o Would have serious concerns for wildlife, such as goshawks, that require an overstory canopy habitat.

√ Pre-commercial thin (less than or equal to 7 inches DBH) only – would not meet Purpose and Need because:
  - o Would not sufficiently affect crown fire potential.
  - o Would return quickly to pre-treatment densities.

2.4 Comparison of Alternatives

In Chapter 1 – Introduction: Purpose and Need, several issues were described in relation to the proposed project. For each issue and indicator to quantify and measure the effects of treatments was developed. This section briefly compares the effects of each alternative with regard to those indicators. For a more detailed description of proposed alternative effects refer to Chapter 4 – Analysis of Effects.

Table 2.4 tracks the indicators described in Chapter 1 – Introduction: Purpose and Need, and displays the extent to which each alternative affects these indicators.

Table 2.5 and Table 2.6 display a more detailed breakdown of each alternative affects to the fire behavior expected after treatment and impacts to the soils resource respectively.

Each of the proposed alternatives have been described and evaluated as to their effectiveness at meeting the Purpose and Need as defined in Chapter 1, and evaluated with regard to the expected environmental impacts to the natural and human environment.

Alternative A – the No Action Alternative would not reduce the amount of hazardous fuels on the mountain and therefore does not reduce the risk of crown fire or improve fire suppression opportunities within the project area. Alternative A does not reduce stand densities; therefore trees would remain highly susceptible to insect infestations due to their low vigor as a result of high stocking densities. For these reasons Alternative A does not meet the stated Purpose and Need for this project.

Alternative B – this alternative would only reduce hazardous fuels on approximately 225 acres. The size limit on tree size to be removed would not allow enough fuels to be removed, even in treated stands to reduce the risk of crown fire. As a result the stands in the project are would be nearly indistinguishable from the conditions present under Alternative A. For these reasons Alternative B would not meet the stated Purpose and Need for this project.

Alternatives C, D, E and F all substantially reduce the hazardous fuels and the risk of crown fire within the project area. These alternatives create a defensible space around the project boundary that could be used in the event of wildfire. The presence of a defensible space in this area would increase firefighter safety by reducing the risks to human life as a result of lower fuel densities. These alternatives also increase the stand vigor by reducing stocking densities, this would increase tree resistance to insect infestations and curtail the current insect epidemic. However, Alternative D would be inconsistent with the John Day RMP with regard to visual resources. The extent to which each of the primary objectives described in the Purpose and Need is affected is shown in Table 2.4.

Table 2.4 – Indicator Measures by Alternative

	Alternatives					
Indicator	**A**	**B**	**C**	**D**	**E**	**F**
BLM Lands Exhibiting Surface Fire Behavior	11%	11%	58%	76%	73%	56%
BLM Lands within ¼ mile of Boundary within 0-60 Basal Area Range - Defensible Space	0%	0%	43%	66%	55%	46%
BLM Lands within Basal Area Densities Promoting Healthy Forest Conditions	61%	61%	75%	84%	88%	77%
Visual Dominance Elements						
Form	None	Weak	Weak	Weak	Weak	Weak
Line	None	Weak	Weak	Weak	Weak	Weak
Color	None	Weak	Weak	Moderate	Weak	Weak
Texture	None	Weak	Weak	Moderate	Weak	Weak
Miles of Road Improvements	0	0	0	2.72	2.87	0
Miles of Road Obliterations	0	0	0	0.15	0	0
Supplemental Miles of Road Obliterations	0	0	0	5	0	0
Acres of Vehicles Closure	0	0	0	130	0	130
Acres of Heavy Equipment Ground Disturbance	0	0	716	701	787	619
Net Economic Value of Treatment Bi-Products (Thousands of Dollars)	0	12	457	347	564	442
Additional Project Implementation Costs (Thousands of Dollars)	0	0	0	238	175	8

Table 2.5 – Fire Regime as a Result of Treatment by Alternative and Climatic Conditions

ALT	**Summary**	**Pre-Treatment Basal Area**	**Post Treatment BA**	**% Fire Type 90th Percentile ***	**% Fire Type 97th Percentile**	**Change in Post-Treat % Fire Type**
A	No Action, 70 ac. fuel break	95.8 ft^2/ac	No change	67% surface 22% active 11 % cond.**	11% surface 11% passive 78% active	No change
B	Thin from below, less than 12 in DBH.	143.0 ft^2/ac (Note: treated area only)	109.2 ft^2/ac	67% surface 17% cond. 16% active	33% surface 33% cond. 34% active	50% surface 33% cond. 17% active
C	Historicial Perspective 30-50/60-100 BA target	100.4 ft^2/ac 99.0 ft^2/ac	30-50 ft^2/ac 60-100 ft^2/ac	44% surface 22% passive 33% active 78% surface 12% passive	11%surface 11% cond. 22% passive 56% active 44% surface 11% passive 44% active	78% surface 11% cond. 11% active 67% surface 11% cond. 11% passive 11% active
D	Uniform Treatment – 30-50 BA target	95.8 ft^2/ac	40-60 ft^2/ac	67% surface 22% active 11 % cond.	11% surface 11% passive 78% active	89% surface 11% cond.
E	Graded Treatment – 40-50/50-70/ 70-90/90-100 BA target	138.1 ft^2/ac 168.8 ft^2/ac 159.5 ft^2/ac 119.1 ft^2/ac	40-50 ft^2/ac 50-70 ft^2/ac 70-90 ft^2/ac 90-100 ft^2/ac	66% surface 34% passive 66% cond. 34% active 66% surface 34% cond. 100% passive	66% cond. 34% active 100% active 33% surface 33% passive 34% active 33% passive 64% active	100 % surface 66% surface 34% active 66% surface 34% cond. 66% passive 34% active
F	Stratified by Species Treatment – 0-40/40-60/ 60-80/80-100 BA target	81.3 ft^2/ac 178.2 ft^2/ac 164.0 ft^2/ac 145.5 ft^2/ac	0-40 ft^2/ac 40-60 ft^2/ac 60-68 ft^2/ac 80-100 ft^2/ac	66% surface 34% active 33% surface 64% cond. 66% surface 34% cond. 66% surface 34% cond.	66% surface 34% active 33% cond. 64% active 100% active 66% surface 34% cond.	100% surface 66% surface 34% cond. 66% surface 34% cond. 100% surface

* The percent of fire type was calculated from the sample plots selected to represent each alternative. Different representative units were used for each alternative to ensure that the sample plots adequately reflected the pre- and post-treatment conditions anticipated in each action alternative.

** Conditional fire (cond.) behavior refers to a fire that is on the verge of transitioning between a surface and a passive crown fire.

Table 2.6 - Summary of possible treatment impacts to the soil resource by Alternative

Soil Resource Impacts	Alternatives					
	(A) No-Action	(B) BMBP	(C) Historic	(D) Uniform	(E) Graded	(F) Stratified
Potential Soil disturbance from ground based logging (based on acres of <35 percent slopes)	Low 0 Acres	Low 0 acres	High 716 ac	Mod High 701 ac	High 787 ac	Mod High 619 ac
Intense Burn Probability (based on treated BA amounts)	High	Mod High	Mod Low	Low	Mod Low	Mod Low
Erosion and Sedimentation from roads, trails, ditches (based on road treatments)	High	High	High	Moderate	Mod High	High
Hand Pile Burn Impacts (based on slash generated) 1/	Low 0 BA Slash	Low 11,668 BA Slash	Very High 124,607 BA Slash	Very High 159,591 BA Slash	High 59,272 BA Slash	Mod 25,813 BA Slash

1/ Slash tree numbers were estimated from averages of data plots located within each Basal Area thinning unit for each alternative (see Appendix Q).

2.4.1 Alternative A – No Management Action

As a result of the No Action alternative, catastrophic fire risk in the project area would be expected to increase over time. Canyon City, already identified as a high-risk town, would continue to be threatened by the potential for stand-replacing wildfire extending into the city limits and outlying residences. Firefighters would be placed at increasing risk as fuel loads, and subsequently fire behavior, increased.

If no thinning treatments are carried out, there will be additional mortality in the ponderosa pine component of these stands as a result of continued insect damage. Although it is not possible to predict accurately how extensive this mortality will be, a four-fold increase above the mortality that has already occurred based on the present number of trees being attacked could occur. Many of the trees that die are likely to be the largest trees in the stand, given that some of the recent mortality has included trees of large diameter (32 inches dbh). These larger trees are growing less vigorously (20-50 growth rings per inch) and, therefore, have a lower resistance to beetles than do younger trees because these larger diameter trees contain larger inner bark surface areas which are capable of producing large numbers of bark beetle brood.

The resulting loss of canopy cover would create a visible opening in the existing vegetative cover, resulting in a strong contrast in the form, color and texture of the vegetation, when compared with the existing characteristic landscape.

2.4.2 Action Alternatives B-F

2.4.2.1 Fuels

Proposed treatments may lessen the risk – to varying degrees – of a catastrophic fire event occurring in the project area and running into the community of Canyon City and nearby residences. Thinning trees reduces overall canopy cover and opens up the stands, reducing the risk of crown fire, however, thinning also allows for faster growth of young trees, which will result in crowded conditions if stand densities are not maintained into the future with additional mechanical or prescribed burn entries.

See Table 2.5 for a comparison by alternative.

2.4.2.2 Entomology

The threshold basal area that constitutes the "Upper Management Zone" (UMZ) for the LCM stands is 100 basal area (BA), as determined from stand examinations that included measurements of the recent radial growth of co-dominant trees (Vidourek, 2002). Stands with stocking densities above this level can be considered susceptible to infestation by bark beetles. Treated stands where the residual basal areas are below the UMZ of 100 square feet of basal area per acre are far less likely to experience mortality from bark beetles. As such, the degree to which the alternatives address the hazard reduction to bark beetles is a function of the number of treated acres where the residual basal area is brought below 100 square feet per acre. Alternatives C through F would all reduce the hazard to bark beetles by a substantial degree, and any of them should provide a mosaic of stand conditions where bark beetle activity would be within endemic levels, consistent with a more natural setting than the one that exists today. Alternative B, by limiting the treatable acres to 225, and by setting a size limit on the trees to be removed, does very little to reduce stand vulnerability to bark beetle depredation. From the perspective of minimizing bark beetle populations, reductions in basal area that are far below the UMZ are not necessarily better than lesser reductions, although the more extreme treatments would allow more time to pass before the stands once again grow into a susceptible state. Alternatives C and F would each leave about 10 percent of the area at stocking densities above the UMZ and hence susceptible to bark beetles. From a landscape perspective, this is a small proportion within susceptible stand conditions, and should not impair the attainment of the management objectives for the project area. Instead, having a small residual proportion within susceptible stand conditions in Alternatives C and F will provide a source of horizontal diversity in the LCM area where new snags will naturally occur and where foraging opportunities will be provided for woodpeckers. Alternatives D and E would provide even less habitat for bark beetles and their predators than the other alternatives.

See Table 2.6 for a comparison by alternative.

2.4.2.3 Silvicultural Resources

By treating only trees less then 12 inches DBH in Alternative B, target basal areas could not be attained. Insects would be allowed to do the density thinning, risking losing much of the forest stand, including trees greater than 12 inches DBH, to insects and possibly more or the entire stand to catastrophic wildfire. "Once an outbreak begins, beetles select the largest trees in a stand. The natural resistance of trees and stands to attack by mountain pine beetle decreases as age and competition increase" (PNW FRM 1991).

Since insect infested and healthy trees would be thinned from below in alternatives B, C and D, the current insect infestation would continue to kill the larger healthy trees, especially in the areas with a higher target basal area. Alternatives E and F would target insect infested trees for removal.

2.4.2.4 Visual Resources

Each of the alternatives would have some effect on visual resources. Alternative B would have the least direct effects on visual resources, but would have the same indirect effects as those described in the no action alternative, since the effects of uncontrolled insect infestations and the risk of stand-replacing fire would remain the same. Alternative B, C, E, & F would meet Class II VRM objectives. Alternative D would not meet Class II VRM objectives.

See Table 2.4 for a comparison by alternative.

The following visual depictions (Tables 2.7- 2.14) from the Stand Vegetation System visually describe several actual plots located on the mountain and show how each stand would likely appear after treatments under the various alternatives from within the stand itself.

The following map (Map 2.6) shows where these stands are located on the mountain.

Computer graphics have been used to simulate how LCM may appear after treatment under alternative C-F (Visible changes are not expected from alternative B) (Table 2.15).

Map 2.6 – Stand Exam Locations for Visual Depiction

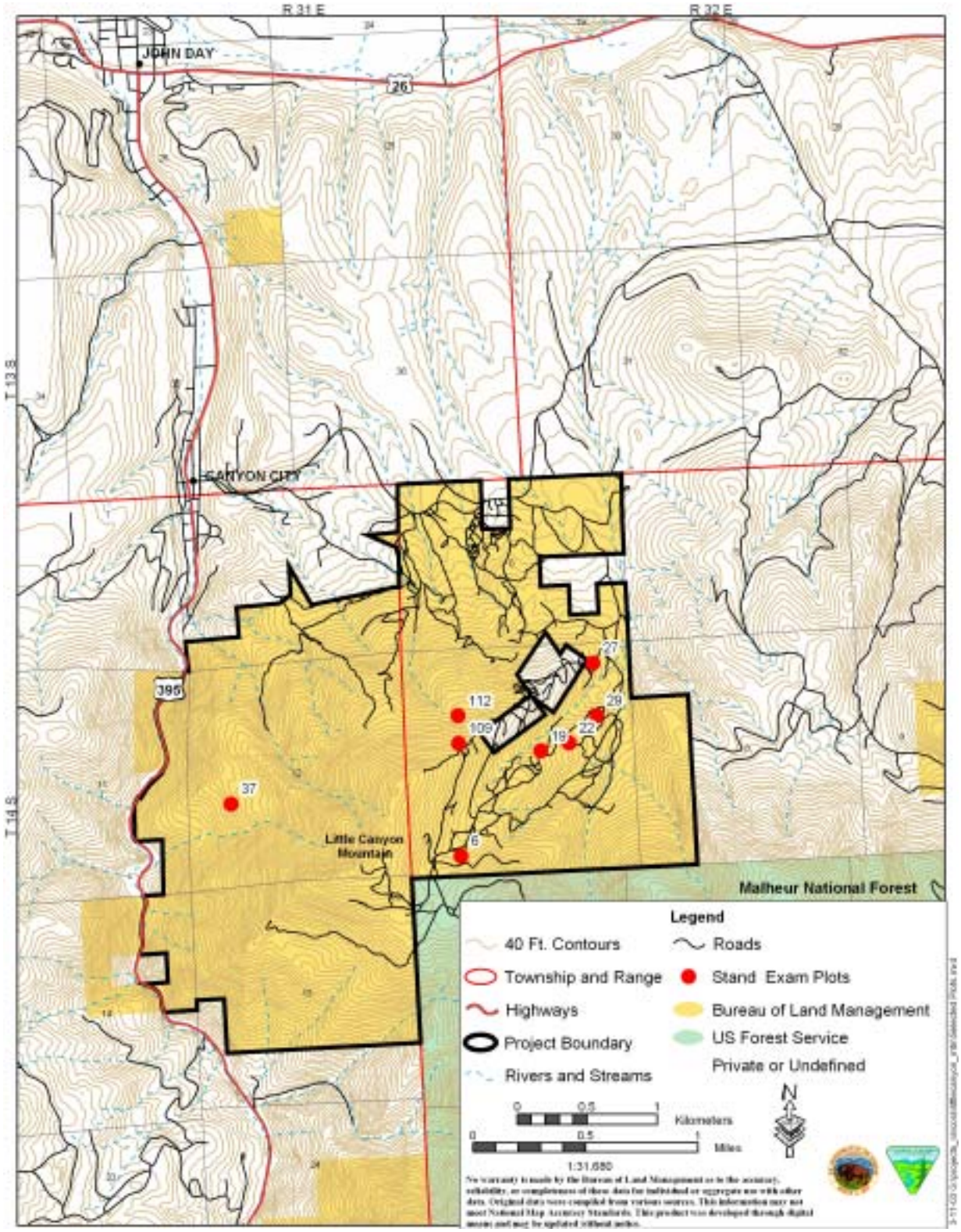
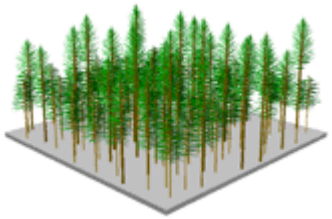


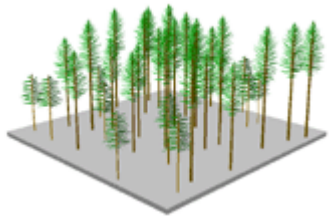
Table 2.7 – Stand Visualizations after Treatment

Plot Number 6

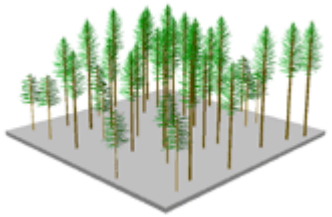
Pictures Depict:
Alternative A –
No Treatment
Alternative B –
Up to 12 inch DBH Thinning
Alternative C –
Traditional Forest 60-100 Basal Treatment



Alternative A
Basal Area = 99
Cover % = 74
Type of Fire = Surface

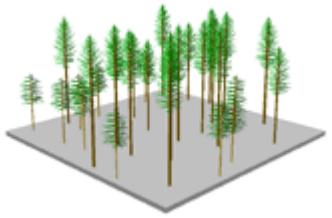


Alternative B
Basal Area = 64
Cover % = 24
Type of Fire = Surface

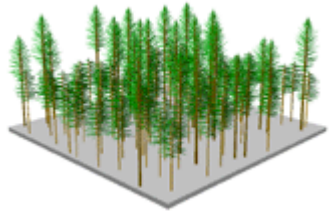


Alternative C
Basal Area = 64
Cover % = 24
Type of Fire = Surface

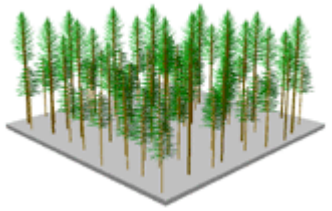
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 90-100 Basal Treatment
Alternative F –
Stratified 80-100 Basal Treatment



Alternative D
Basal Area = 55
Cover % = 20
Type of Fire = Surface



Alternative E
Basal Area = 92
Cover % = 65
Type of Fire = Surface



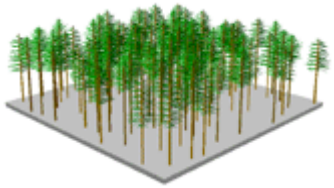
Alternative F
Basal Area = 84
Cover % = 54
Type of Fire = Surface

Table 2.8 – Stand Visualizations after Treatment

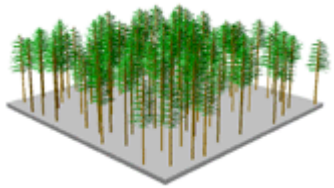
Plot Number 19

Pictures Depict:
Alternative A –
No Treatment
Alternative B –
Up to 12 inch DBH Thinning
Alternative C –
Traditional Forest 60-100 Basal Treatment

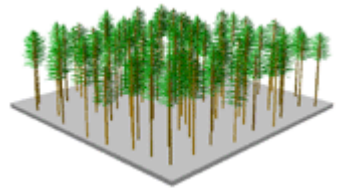
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 90-100 Basal Treatment
Alternative F –
Stratified 80-100 Basal Treatment



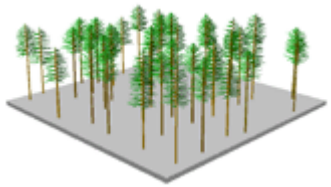
Alternative A
Basal Area = 100
Cover % = 62
Type of Fire =
Surface/Passive Crown



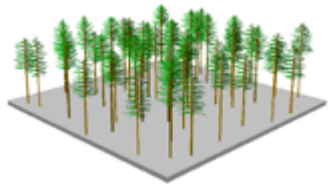
Alternative B
Basal Area = 100
Cover % = 62
Type of Fire =
Surface/Passive Crown



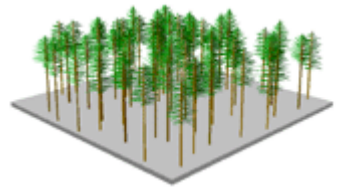
Alternative C
Basal Area = 89
Cover % = 56
Type of Fire =
Surface/Passive Crown



Alternative D
Basal Area = 51
Cover % = 28
Type of Fire = Surface



Alternative E
Basal Area = 58
Cover % = 33
Type of Fire = Surface



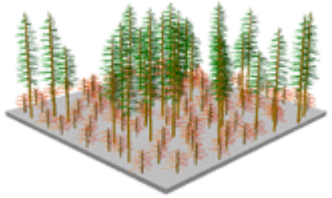
Alternative F
Basal Area = 72
Cover % = 42
Type of Fire = Surface

Table 2.9 – Stand Visualizations after Treatment

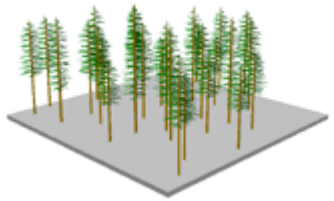
Plot Number 22

Pictures Depict:
Alternative A –
No Treatment
Alternative B –
Up to 12 inch DBH Thinning
Alternative C –
Traditional Forest 60-100 Basal Treatment

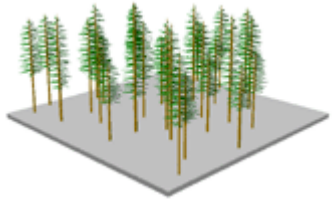
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 50-70 Treatment
Alternative F –
Stratified 40-60 Treatment



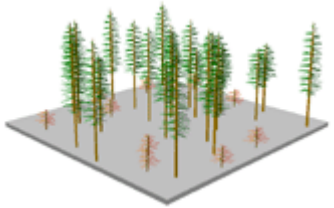
Alternative A
Basal Area = 100
Cover % = 69
Type of Fire = Active Crown



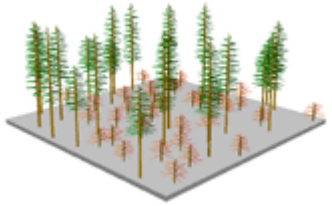
Alternative B
Basal Area = 60
Cover % = 23
Type of Fire = Active Crown



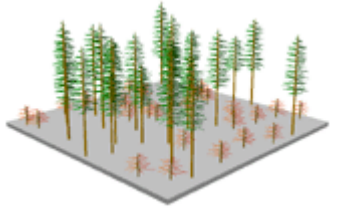
Alternative C
Basal Area = 60
Cover % = 23
Type of Fire = Surface



Alternative D
Basal Area = 55
Cover % = 22
Type of Fire = Surface



Alternative E
Basal Area = 64
Cover % = 41
Type of Fire = Passive Crown



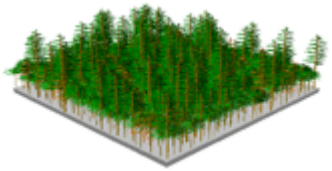
Alternative F
Basal Area = 59
Cover % = 33
Type of Fire = Surface

Table 2.10 – Stand Visualizations after Treatment

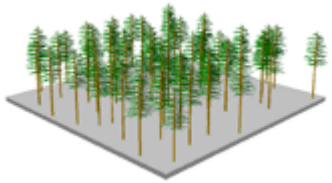
Plot Number 27

Pictures Depict:
Alternative A –
No Treatment
Alternative B –
Up to 12 inch DBH Thinning
Alternative C –
Traditional Forest 40-60 Treatment

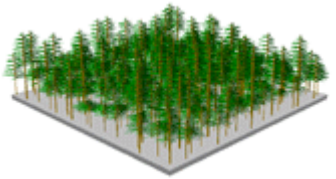
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 40-50 Basal Treatment
Alternative F –
Stratified 40-60 Basal Treatment



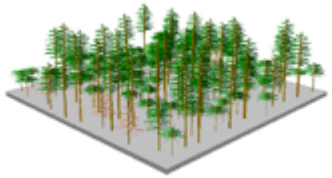
Alternative A
Basal Area = 127
Cover % = 100
Type of Fire = Active Crown



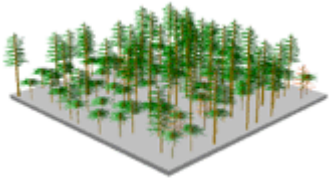
Alternative B
Basal Area = 60
Cover % = 41
Type of Fire = Surface



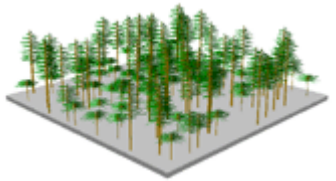
Alternative C
Basal Area = 98
Cover % = 98
Type of Fire = Active Crown



Alternative D
Basal Area = 56
Cover % = 73
Type of Fire = Surface



Alternative E
Basal Area = 55
Cover % = 74
Type of Fire = Surface



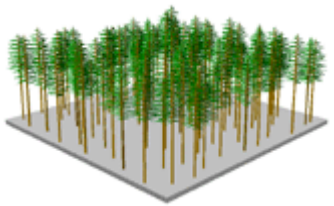
Alternative F
Basal Area = 54
Cover % = 67
Type of Fire = Surface

Table 2.11 – Stand Visualizations after Treatment

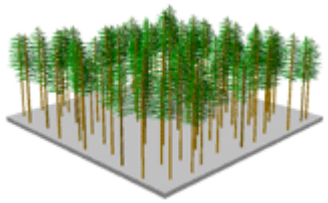
Plot Number 29

Pictures Depict:
Alternative A –
No Treatment
Alternative B –
Up to 12 inch DBH Thinning
Alternative C –
Traditional Forest 60-100 Basal Treatment

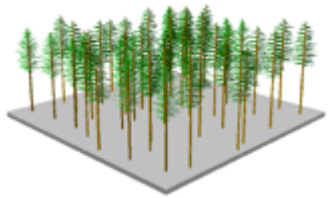
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 40-50 Basal Treatment
Alternative F –
Stratified 60-80 Basal Treatment



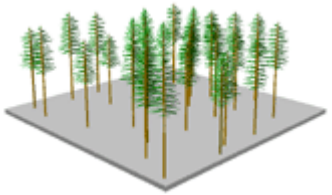
Alternative A
Basal Area = 136
Cover % = 53
Type of Fire =
Surface/Passive Crown



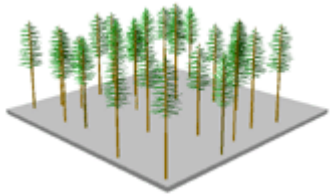
Alternative B
Basal Area = 136
Cover % = 53
Type of Fire =
Surface/Passive Crown



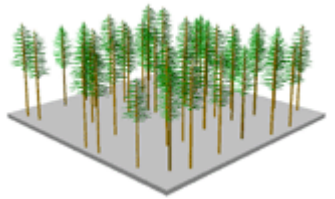
Alternative C
Basal Area = 82
Cover % = 31
Type of Fire = Surface



Alternative D
Basal Area = 54
Cover % = 20
Type of Fire = Surface



Alternative E
Basal Area = 48
Cover % = 15
Type of Fire = Surface



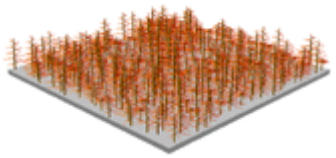
Alternative F
Basal Area = 70
Cover % = 27
Type of Fire = Surface

Table 2.12 – Stand Visualizations after Treatment

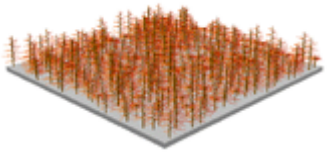
Plot Number 37

Pictures Depict:
Alternative A –
No Treatment
Alternative B –
No Treatment
Alternative C –
Non Forest 30-50 Basal Treatment

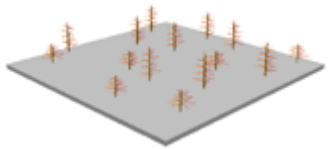
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 50-70 Basal Treatment
Alternative F –
Stratified 0-40 Basal Treatment



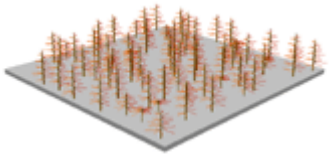
Alternative A
Basal Area = 105
Cover % = 99
Type of Fire = Active Crown



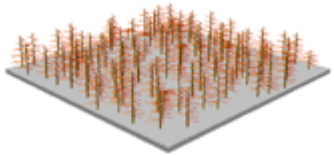
Alternative B
Basal Area = 105
Cover % = 99
Type of Fire = Active Crown



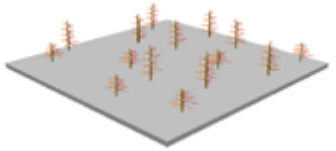
Alternative C
Basal Area = 8
Cover % = 9
Type of Fire = Surface



Alternative D
Basal Area = 44
Cover % = 53
Type of Fire = Active Crown



Alternative E
Basal Area = 65
Cover % = 66
Type of Fire = Active Crown



Alternative F
Basal Area = 8
Cover % = 9
Type of Fire = Surface

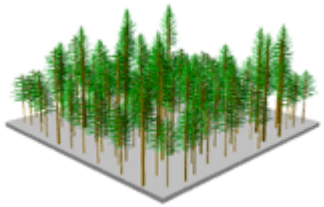
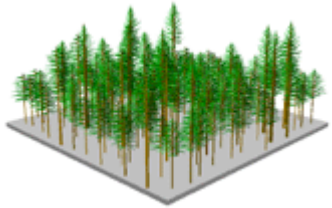
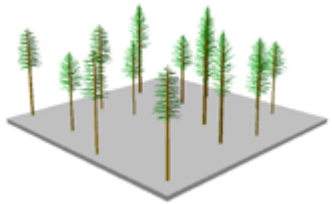
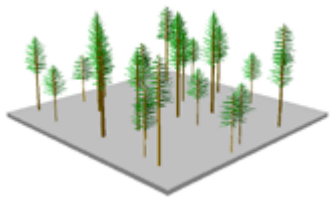
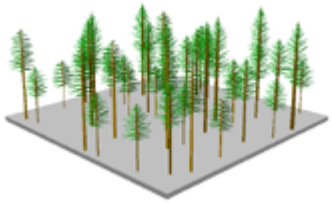
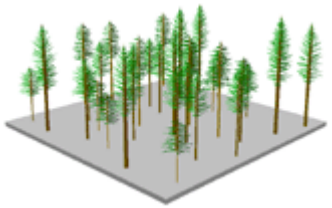
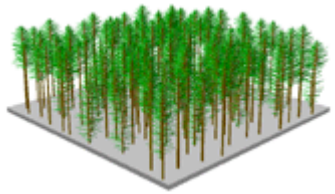
Table 2.13 – Stand Visualizations after Treatment			
Plot Number 109 **Pictures Depict:** Alternative A – No Treatment Alternative B – No Treatment Alternative C – Traditional Forest 60-100 Basal Treatment	 **Alternative A** Basal Area = 122 Cover % = 80 Type of Fire = Surface/Passive Crown	 **Alternative B** Basal Area = 122 Cover % = 80 Type of Fire = Surface/Passive Crown	 **Alternative C** Basal Area = 43 Cover % = 8 Type of Fire = Surface
Alternative D – Uniform 40-60 Basal Treatment Alternative E – Graded 90-100 Basal Treatment Alternative F – Stratified 80-100 Basal Treatment	 **Alternative D** Basal Area = 46 Cover % = 16 Type of Fire = Surface	 **Alternative E** Basal Area = 85 Cover % = 27 Type of Fire = Surface	 **Alternative F** Basal Area = 84 Cover % = 25 Type of Fire = Surface

Table 2.14 – Stand Visualizations after Treatment

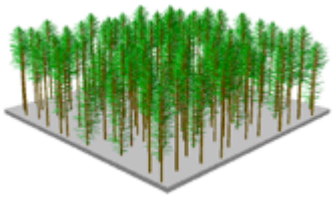
Plot Number 112

Pictures Depict:
Alternative A –
No Treatment
Alternative B –
No Treatment
Alternative C –
Traditional Forest 60-100 Basal Treatment

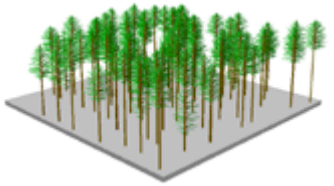
Alternative D –
Uniform 40-60 Basal Treatment
Alternative E –
Graded 70-90 Treatment
Alternative F –
Stratified 80-100 Basal Treatment



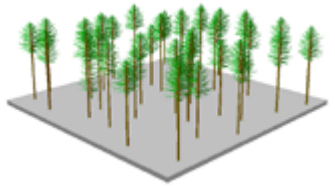
Alternative A
Basal Area = 141
Cover % = 76
Type of Fire = Surface/Passive Crown



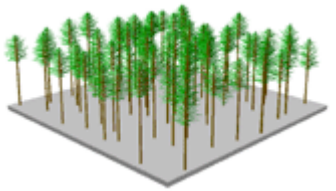
Alternative B
Basal Area = 141
Cover % = 76
Type of Fire = Surface/Passive Crown



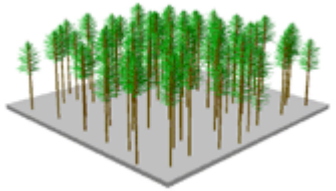
Alternative C
Basal Area = 9
Cover % = 53
Type of Fire = Surface/Passive Crown



Alternative D
Basal Area = 47
Cover % = 25
Type of Fire = Surface



Alternative E
Basal Area = 81
Cover % = 46
Type of Fire = Surface/Passive Crown



Alternative F
Basal Area = 94
Cover % = 54
Type of Fire = Surface/Passive Crown

Table 2.15 – Mountain Visualization After Treatment

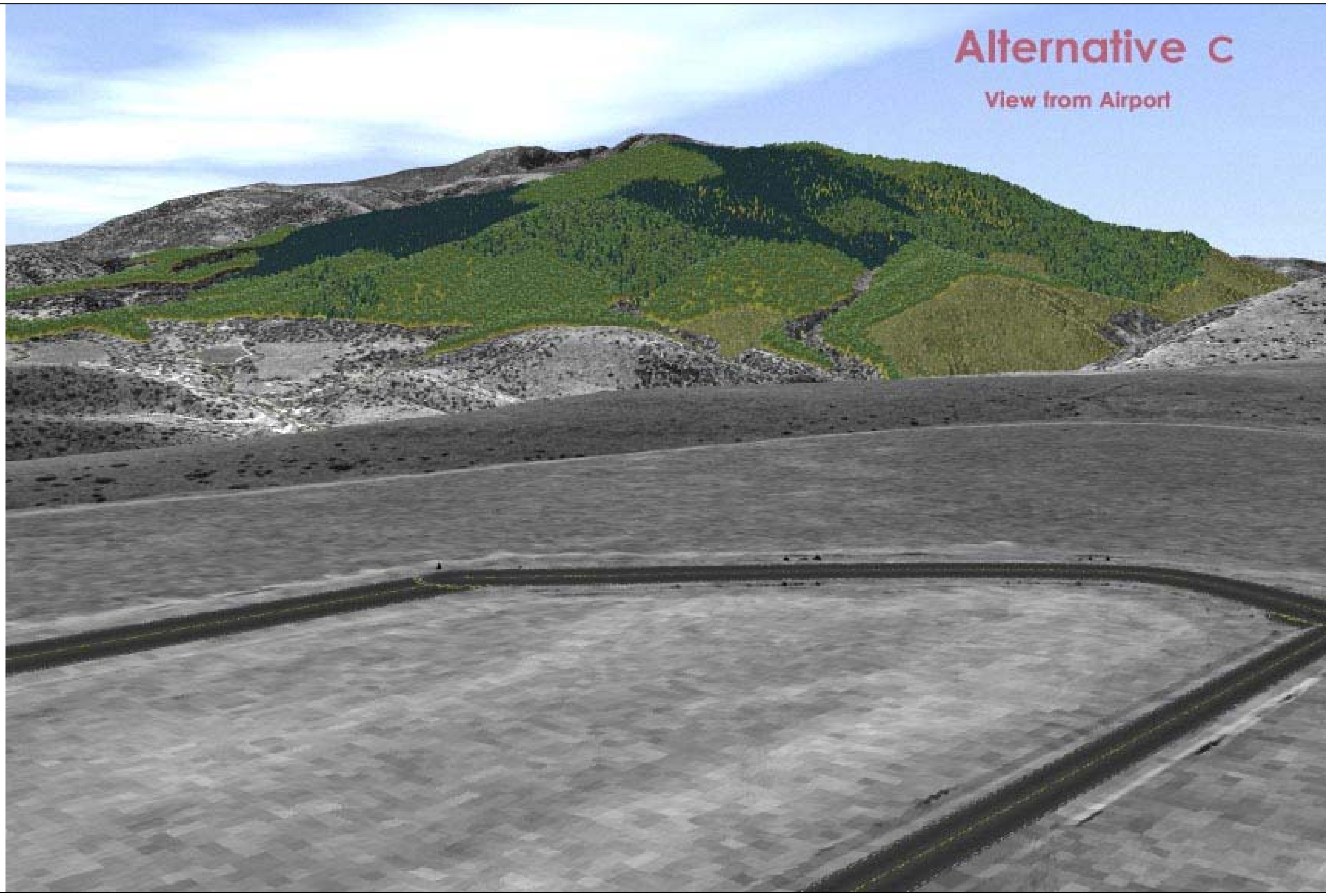


Table 2.15 - Continued

Table 2.15 - Continued

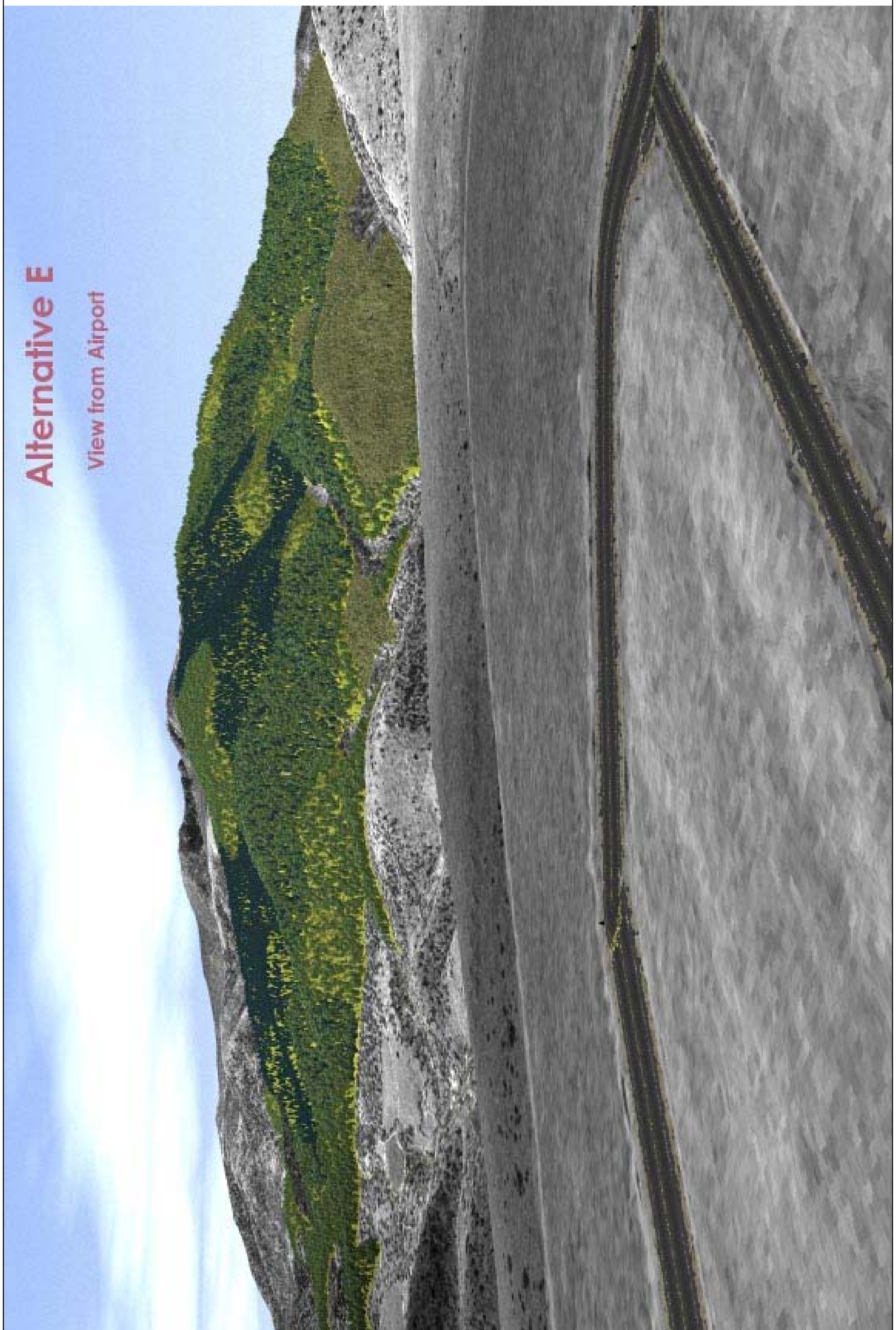


Table 2.15 - Continued


Altenative F
View From the Airport

2.4.2.5 Road Engineering and Transportation

Alternatives D and E include substantial road work in the form of improvement and in Alternative D – realignment. There is no road work proposed in the other alternatives. See Table 2.4for a comparison by alternative.

2.4.2.6 Recreation and OHV Use

Alternatives D and F include a 50 inch vehicle size closure to the 'pit' area in order to discourage garbage dumping. The 'pit' would be buffered by a 100-250 no cut area around its boundary in alternatives C, D & F. See Table 2.4 for a comparison by alternative.

2.4.2.7 Mining and Minerals

Alternative B and Alternative C both have potentially negative impacts on mining. The restrictions suggested by Alternative B severely limit the amount of fuels reduction and treatment of bark beetle infestation. While mitigating the fire hazard, the Alternative C would limit timber resources for mining-related use on some existing and future mining claims.

Alternatives D, E and F, all mitigate existing hazards and threats to miners and mining operations. Each of these alternatives mitigates the fire hazard and beetle infestations while leaving adequate timber resources available for mining-related use.

2.4.2.8 Range Management

In alternative D one mile of riparian boundary fencing is porposed to exclude cattle from Little Pine Creek. See Table 2.4 for a comparison by alternative.

2.4.2.9 Social and Economic

Each alternative results in various amounts of treatment bi-product. The net value of these bi-products is displayed in Table 2.4. Additional project implementation costs for actions such as mahogany treatments, pit closure, and road work are included in this table under Additional Project Implementation Costs.

2.4.2.10 Wildlife

Snags would be retained at the same level in each alternative as described in Section 2.2.4 Design Criteria Common to Alternatives C Through F. Alternatives C and F would retain 210 and 185 acres respectively in thicker forest stand conditions to retain diverse wildlife habitats on the mountain. See Table 2.4 for a comparison by alternative.

2.4.2.11 Fisheries

PACFISH buffers would we applied consistently across alternatives C, D, E and F and would be doubled in Alternative B. The application of PACFISH buffers will protect existing fish habitat from habitat degradation as a result of other activities on LCM. In Alternative D several riparian treatment areas will also be thinned of encroaching conifer overstory in order to open the canopy and release suppressed hardwood species.

2.4.2.12 Special Status Plants

There are no special status plants located on LCM so management alternatives will not affect this resource.

2.4.2.13 Hydrology

See Table 2.4 for a comparison by alternative of road improvements and obliterations to decrease soil movement and impact to the watersheds hydrology functions.

2.4.2.14 Soils

See Table 2.4 for a comparison by alternative of acres of heavy equipment ground disturbance and Table 2.6 for more detailed soil impacts by alternative.

2.5 Monitoring

Monitoring efforts will occur during the implementation phase and after the project is completed in order to measure the effectiveness and accuracy of the treatments. The primary measure to evaluate the effectiveness of this project is to total the number of catastrophic fires that occur on LCM over the next 30 years (the timeframe for the longest re-entry interval for treatment).

Other specific implementation monitoring and effectiveness monitoring will be specified at the time a decision is reached. While many of the alternatives include similar treatments several specific measures that depend upon selected alternative should be included in a monitoring plan if they apply. For this reason rather than describe a hypothetical monitoring plan which would comprehensively address all alternatives, this discussion will be deferred to the Decision Record for this project.

Chapter 3
Existing Environment

3.1 General

Gold was discovered in Canyon Creek on June 8, 1862. This discovery led to placer and hard rock mining in the project area. The mining activity subsequently resulted in construction of roads to individual claims and other ground disturbing activities associated with claim development. Some timber was cut to provide lumber and support material.

Little Canyon Mountain (LCM) is the source of gold that, in large part, caused the rush of 1862 at Canyon City, and its discovery was the primary impetus for the settlement of the John Day valley and much of NE Oregon. The placer mines of the LCM area were considered some of the richest in the state. LCM is the heart of the Canyon Mining District that also includes Miller Mountain, Prairie Diggings (Dog Creek), and the area between Canyon City and John Day. Thousands of California and Oregon prospectors poured into Canyon City between 1862 and 1864. Production from the placers was substantial in the first 10 years, but gradually slowed afterwards. There were brief 'booms' associated with dredging and lode mining around the turn of and early twentieth century (1890-1920). Since that time, most of the mining has been of a subsistence type.

As a result of over a century of mining, there are varying degrees of placer and lode mining related disturbances across the landscape. These include tailing piles, large and small gouged-out washing pits from the hydraulic mining, main and secondary water ditches, sluice water ditches, penstocks, adits (see glossary), mines, glory holes, trenches and roads. The local landscape, particularly that associated with hydraulic mining, has been changed dramatically, as evidenced by the 60 foot high headwalls of some of the pits.

3.1.1 Historical Conditions

The exact state of the historic environment (i.e., the vegetation community) of the project area prior to the influx of gold miners to Canyon Creek in 1862 is difficult to ascertain. A number of different sources of information such as photographic documentation, surveyor notes and personal accounts must be evaluated to even generalize about the characteristics of the project area prior to European settlement.

Based on accounts and available literature, the historic (post-1862) vegetation of the LCM project area appeared to be one exhibiting a steppe environment that extended high on the lower flanks of the mountain, especially on the north side. To what degree the early mining influenced this portion of the vegetation community may never be known. Placer mining activities contributed to a changed landscape and may have added to the existing moisture regime of the setting. From the higher elevation lower slopes the vegetation gradually increased up slope to form a pine/conifer canopy typical of dry land forests east of the

Cascades. The environmental picture presented of the project area, however, must always be understood to be a "snapshot" of the much broader and dynamic scene – one that continues to change due to natural and human events, even today. See Appendix C – the Cultural Specialist Report for more details.

3.2 Resource Specific Conditions

3.2.1 Fuels

The LCM proposed project area is currently experiencing a build-up of hazardous fuels and a highly probable increase in tree mortality caused by several different bark beetles. These are symptoms of the actual problem, which is a deficit of disturbance in a fire-adapted ecosystem. Lacking fire, the forest has become established in an area shown by historic photos to be a shrub-steppe community with stands of conifers in drainages and on some slopes. The area is now showing the undesired effects of high stand density, which is habitat for bark beetles and conditions ripe for crown fire especially coupled with the drought conditions in the area over the last several years. See Appendix D – the Fuels Specialist Report for more details.

Curlleaf mountain mahogany (Cercocarpus ledifolius) is the dominant shrub on much of the project area. This shrub, often found in the mountain brush zone in the Intermountain West is an important browse species for mule deer. Although it may exist as an individual shrub in open forests, it usually occurs in isolated, pure patches that are frequently extremely dense. Eventually, the stands become dominated by a few over-mature individuals with little or no biomass production and reproduction is minimal (Schultz et al. 1990). While suppressed, juvenile plants can grow and survive under a dense overstory for 100 years; however, they will eventually die if not released from competition with mature mahogany (Schultz et al. 1990).

Photo from Plot 37, located in the center portion of Unit-3. This site demonstrates juniper encroachment in a historic shrub-steppe ecosystem, as well as decadent mahogany in the canopy gaps.

3.2.2 Entomology

The LCM stands are experiencing significant tree mortality in the ponderosa pine component due to a complex of four bark beetle species (pine engraver, red turpentine beetle, western pine beetle, mountain pine beetle). Most of this mortality has been very recent, within the last two to three years, and beetle populations are increasing. Many residual pine trees are only carrying the most recent year's foliage in their crowns and do not appear to be in a sufficiently healthy condition to withstand the increase in bark beetles that is occurring. As such, an increase in tree mortality is expected to continue in these stands if the basal areas are not reduced and if drought conditions continue to prevail. See Appendix E – the Entomology Specialist Report for additional details.

3.2.3 Silvicultural Resources

The basal areas (BA)(see glossary) within this analysis area range from 0-222 BA (square feet per acre). As a result the trees within this stand are showing signs of poor individual tree vigor. Trees are currently growing at the rate of 20-50 growth rings per inch. Tree vigor of less than 13 growth rings per inch is necessary for a stand density that in turn controls the habitat conditions for insect propagation (Cochran 1994). "The stands that are most susceptible to moisture stress, insects, and diseases, tend to be those at the lowest elevations, which typically border private, state tribal or other land ownerships. Homes, private, tribal, and state forest resources; wildlife winter ranges; and other important resources are increasingly at risk from fire and insects and disease attacks" (Quigley and Arbelbide 1997). The average age of the ponderosa pine within this stand is approximately 110 years and the average total tree height is approximately 68 feet. Bark beetles thrive in stands of poor vigor, i.e., stands beyond their Upper Management Zone (UMZ) (100 BA on LCM). "UMZ is the stand density at which co-dominant trees are growing at 1 - 1½ inches in diameter in a decade (13 growth rings per inch)" (See Appendix E).

The trees in this stand are less than 140 years old and appear to have originated through natural encroachment from the higher elevations. The pines are of various sizes, which range up to 40 plus inches DBH. Douglas fir trees are generally smaller and less abundant than the ponderosa pines. There has been limited harvest entry, with some overstory removals in 1967. The residual stands are fairly dense and are well above the long-term carrying capacity for this site. Many of the ponderosa pine crowns contain only the most recent year's needles, a condition that could be the result of one or more factors: the recent drought in the area, a possible needle cast disease, and genetics.

This LCM stand is presently rated catastrophic (see glossary). See Appendix F – the Silvicultural Specialist Report for additional details.

3.2.4 Visual Resources

The LCM project area is located 2 miles southeast of John Day and immediately southeast of Canyon City, OR, and comprises a major feature in the viewshed of these communities. LCM is a conical shaped mountain rising in elevation from approximately 3,600 feet at the base to 6,600 feet at the summit. The project area primarily includes the north, northwest and northeast facing slopes of the mountain. These aspects make the project area visible from many common viewing areas including the cities of John Day and Canyon City, sections of U.S. Highways 26 and 395, housing subdivisions in the area, and several well-traveled county roads.

From most viewing areas, the north slopes of LCM generally appear in the foreground or mid-ground, sloping up and away from the viewer. In the background the top of Canyon Mountain is visible, rising up behind LCM to an elevation of 7,874 feet. Just outside the project area, to the east, a long high ridge is visible leading up to Canyon Mountain. From some viewing areas, low hills at the base of LCM are visible in the foreground and partially obscure the lower elevations of LCM. The southeast portion of the project area is obscured from most common viewing areas as it is located in a basin between LCM and Canyon Mountain.

Beyond the immediate project area, LCM is surrounded on three sides by mountains which include both public and private ownership. To the east and west are private timbered lands which have visible evidence of past forest thinning. To the south is USFS land, most of which is included in the Strawberry Mountain Wilderness Area. A past wildfire in the wilderness has left areas of standing and fallen grey-colored snags, and bare unforested areas, visible just behind and above the main northeast-southwest ridge of LCM. To the north of the project area, low hills flank the base of LCM, bisected by numerous drainages cutting north towards the John Day River. The appearance of the hills has been altered by past activities including mining, fire, road building, cutting of timber and juniper, and clearing of vegetation for agricultural purposes. A few homes and ranch buildings are scattered throughout the hills.

The landscape type is a feature landscape, in which the project area, LCM, is the dominant feature. The dominance elements are form and vegetative texture. Natural patterns tend to be relatively triangular, caused by the ridgelines of LCM, the foreground hills, and the high peaks in the background. Strong continuity in color and texture is established on LCM by the nearly complete tree canopy. Depending on available lighting, patches of red insect-infested trees are noticeable within the solid dark green forest of LCM, which is a growing concern to local citizens as more trees are affected by insects. However, a variety of texture and color is provided in the mountains behind and to either side of LCM, and in the low grassy hills in the foreground.

3.2.5 Road Engineering and Transportation

The main road into the project area (Map 2.4), is a one-lane road with turnouts. This road is used to access land under the jurisdiction of the Bureau of Land Management, Malheur

National Forest, and private holdings. This road also accesses the trailhead for the Canyon Mountain Trail on the Malheur National Forest. The road receives very little maintenance. Because of the lack of maintenance, the road surface is in very poor condition in many areas and is not suitable for haul at this time.

The first 0.3 miles of this road has a twelve foot wide Bituminous Surface Treatment (BST) (see glossary) that is in good condition except the last 400 feet which has pot holes. At the end of the BST the surface changes to native material. Between MP 0.3 and MP 0.7 there are several areas with deep rutting due to the high clay content of the soils and inadequate drainage. From MP 0.7 to MP 1.2 the road is in the bottom of a draw and runs parallel to Little Pine Creek. Extensive use during times when the road is wet has resulted in areas of severe rutting. Because of inadequate drainage features, water runs down the road from these areas of rutting and then into the creek resulting in sediment in the stream.

From MP 1.2 the road climbs up the ridge through a series of seven switchbacks to MP 2.6 which is in a saddle in the northwest quarter of Section 18. Most of this section of the road is twelve to fourteen feet wide. There are areas along this section of the road that have rutting due to the high clay content of the soils and usage during times when the road is wet. The mud created by this rutting does have the potential to reach streams. As a result of vehicles 'cutting corners' in switchback areas of the road, numerous Off-Highway Vehicle (OHV) and jeep trails have been created going straight down the hill resulting in increased rutting and erosion.

At MP 2.6 the road turns west and northwest and climbs to its terminus in Section 12. This last section of road is only eight to ten feet wide and would need to be widened prior to extensive use as a haul route. The entire road past MP 0.3 has native material for a surface and is in very bad condition in many areas due to inadequate drainage and the high clay content of the soils.

In addition to the main road there are many side roads that have been built to access mining claims, harvest timber or fight fires. These roads have native surfacing, are in poor shape and have the potential to rut and contribute sediment to streams if they are left in their present condition. See Appendix H – Road and Engineering Specialist Report for additional details.

3.2.6 Recreation and OHV Use

The Little Canyon Mountain project area includes 2498 acres of land designated as open to OHV's. There are 26 miles of roads (roads are more than 50" wide and wide enough for a full sized vehicle or Class II OHV) and 5 miles of Class I/III routes (less than 50" and wide enough for a Class I/III OHV). Currently all Classes of OHV's use many of the roads. The total motorized route density is 7.88 miles per square mile. Much of the land is very steep and many of the routes have no drainage built into them. The soils contain a high amount of clay and the routes rut easily.

A 104-acre hydraulically mined pit is currently used as a play area by all classes of OHV's and as access to many OHV routes in the area. Numerous motorized routes in the area are also used as access to mining claims scattered across LCM. An irrigation ditch runs through the pit and is often diverted by Class II OHV users to create a mud bogging area within the pit. In addition to OHV use, the pit is also used for recreational shooting, as well as for dumping garbage, furniture, appliances, and car bodies.

LCM is located a short distance from Canyon City and John Day. It provides OHV recreation opportunities right out many residents' back doors. The area is close to the Strawberry Mountain Wilderness as well. A major access point to the wilderness is through the LCM project area. See Appendix I – Recreation and OHV Specialist Report for additional details.

3.2.7 Mining and Minerals

Gold-bearing veins of massive white quartz are found in the upper slopes of LCM as lode deposits. Erosion through geologic time has removed gold from veins exposed at the surface and transported it to nearby streams. Hydrodynamic separation by fluvial processes concentrated the gold in placer deposits on the lower slopes of LCM, in Canyon Creek, and in the John Day River.

Gold has been the most important economic mineral commodity from the LCM area with less significant quantities of silver also being produced. Between discovery in 1862 and 1908, an estimated 600,000 ounces of gold were produced from the Canyon Mining District, which includes lands adjacent to the LCM area (Thayer et al. 1981). Dredges in Canyon Creek and in the John Day valley around the city of John Day produced 124,000 and 13,000 ounces of gold and silver respectively from 1916-1929 and from 1935-1942 (Brooks and Ramp 1968; Thayer et al. 1981). Relatively small amounts of gold have been produced from the Canyon Mining District since the last dredge was dismantled in 1942.

Currently, there are 18 active gold claims on LCM including 12 placer, 5 lode, and 1 mill site. In addition, there is the Great Northern Mine, a patented lode claim. Modern production data from these claims are unavailable, as information from individual mining companies is no longer accessible to the public (Orr et al. 1992).

Although mining in the LCM area has focused on gold and silver, there are other minerals that may be sought after sometime in the future. These include serpentine, chrysotile asbestos, nickel, platinum-group metals, and quartz. See Appendix J – Minerals Specialist Report for additional details.

3.2.8 Range Management

There are currently three grazing allotments within the project area: the Echo Allotment, the Pointer Allotment and the Canyon Mountain Allotment.

The grazing preference for the Echo Allotment is 5 AUM's with a grazing season of May 15th to August 30th. There are 37.5 acres of private lands and approximately 32 acres of public lands within the allotment boundary. There is no fence between the public and private lands. The grazing fees have been paid but there has been no intentional grazing, but occasionally livestock have drifted onto the public lands for a short period. The grazing fees have been paid to hold the grazing lease.

The grazing preference for the Canyon Mountain Allotment is 5 AUM's with a grazing season of May 1st through June 15th. There are 15 acres of private lands and 50 acres of public lands within the allotment.

The grazing preference for the Pointer Allotment is 12 AUM's with a grazing season of April 1st through November 30th. There are 190 acres of private lands and approximately 100 acres of public lands. There is currently no fence between the public and private lands. Prior to 1996, BLM managed lands in the Pointer Allotment were included with the Canyon Mountain Allotment. In 1996, the partial purchase of base property lead to the splitting of this allotment. After the purchase of the private lands, the Pointer Allotment was created.

Non-use was approved in 2002, 2001, and 2000. The grazing bill was paid in 1999, 1998, 1997, and 1996. From observing the public lands and conversations with the permittee, it has been a long period of time since any livestock have grazed the public lands. When the permittee paid the grazing bill, he did not graze his public or private lands. When the previous permittee grazed these lands it appears that no livestock grazed the public lands.

The current permittee would like to initiate a grazing system incorporating both the public lands and the private lands. Grazing approval would be dependent on the authorization and subsequent construction of a fence on the east side of Little Pine Creek. The proposal is to graze approximately 12 head on both the public and private lands in a rotation grazing system for a period of time that would be determined by the Bureau of Land Management. See Appendix K - the Range Management Specialist Report for additional details.

3.2.9 Social and Economic

Grant County was created in 1864 and consists of 4,528 square miles of land, located primarily in the John Day Basin. In 1985 the population of Grant County was 8,230 people (GCCC 2003). Since 1970 population in Grant County has grown by 11 percent, a rate slower than the state-wide and national average.

Originally a mining town, Canyon City witnessed the excitement of the gold rush. The remnants and effects of mining can still be seen on Little Canyon Mountain today. Several claims still exist on the mountain and of these several have been patented. Numerous roads and trails have been created to access mining claims and other areas on the mountain. These roads and trails are not maintained and are in terrible shape. The main access road connects the county road to the Canyon Mountain Trailhead on the Malheur National Forest. While it

does function as a travel corridor for vehicles, its present condition deters, and under some weather conditions prohibits access.
As mineral activities became less lucrative the economy of the local region looked to other commodity based support, such as farming, ranching and timber production.

The logging industry surpassed all other industries in the county by the early 1940s. The past decade, however; has witnessed a substantial decrease in the logging industry in Grant County. Since 1989 the amount of timber harvested in Grant County has decreased by roughly 80 percent. While the BLM manages some timbered lands within Grant County harvest from these lands has never been a consistently substantial contributor to the local economy. Individual sales have occurred but not to the scale seen from other publicly managed lands in the area. Little Canyon Mountain has not been commercially logged by the BLM in the time it has been under BLM managed with the exception of a small salvage harvest operation that occurred in the mid 1990s.

The stands on Little Canyon Mountain are overstocked due to a lack of natural fire disturbance and lack of any significant management treatments over the last 75 to 100 years. These stand conditions coupled with existing drought have led to an outbreak of several insect species which are attacking and killing large numbers of trees on the mountainside.

On a national level the concern over stands such as these are moving to the forefront in resource management. The advent of more frequent, catastrophic stand replacement and community threatening fires has sparked several local, regional and national initiatives to address the concern. Locally Little Canyon Mountain has drawn much attention as an area that has not been managed to reduce the risk to the local communities from a catastrophic fire event.

Little Canyon Mountain provides the backdrop for the towns of John Day and Canyon City. From almost any point in these two communities Little Canyon Mountain can be seen rising in the background. As a result of its prominence in the local landscape conditions such as numerous red (dead) trees as the result of insect infestation and thicker stand conditions than adjacent lands draws attention to Little Canyon Mountain.

These concerns, and others, have led to the formation of the Little Canyon Mountain working group – a group dedicated to see action taken on the mountain to reduce the insect levels and protect the local communities and homes in the event of wildfire on the mountain. There are approximately 22 homes and 18 outbuildings adjacent to the Little Canyon Mountain project area. In addition to resource concerns this group has also drawn the attention to the recreational use on the mountain.

The BLM has not actively managed this area recreationally. Its close proximity to town draws local users to the area. Unfortunately most of the recreation use is not legal – primarily trash and household garbage dumping specifically within the pit area and firewood theft from forested areas on the mountain. A road counter was installed on the main access road in the initial stages of developing management options for the area – these 'car counts' showed substantial use of the road and the area does occur – mostly between midnight and

two a.m. Use at these times does not indicate that the users are utilizing the mountain in 'traditional' recreation fashion. The mountain also provides substantial OHV use as evidenced by the number of trails on its slopes.

3.2.10 Wildlife

Many of the habitat descriptions and wildlife species associations in this report were developed through extensive use of the publication "Wildlife-Habitat Relationships in Oregon and Washington" (Johnson and O'Neil, 2001) and the "Matrixes for Wildlife-Habitat Relationships in Oregon and Washington CD-ROM" (O'Neil et al. 2001). The descriptive habitat/species matrixes in these references were developed using some 60,000 records of data, 100,000 pieces of literature, and panels of fifteen groups of expert specialists.

There are four major wildlife habitat types found in the LCM project area. Included are:
1) Ponderosa Pine Forest and Woodlands
2) Eastside (Interior) Mixed Conifer Forest
3) Western Juniper and Mountain Mahogany Woodlands
4) Eastside (Interior) Riparian-Wetlands

Table 3.1 Number of wildlife species associated with each habitat type (O'Neil et al. 2001).

Taxonomic Class	Habitat Type			
	Ponderosa Pine Forest and Woodlands	Eastside (Interior) Mixed Conifer Forest	Western Juniper and Mahogany Woodlands	Eastside (Interior) Riparian - Wetlands
Amphibians	13	12	7	14
Reptiles	21	11	16	10
Birds	131	101	101	163
Mammals	67	80	43	79
All Species	232	219	167	266

Habitat functions in the LCM area have been modified from historic conditions. Practices such as mining, road construction, fire suppression, grazing and timber harvest have changed the quantity and quality of wildlife habitat for many species.

The high road density associated with the analysis area is reducing the habitat security for many species. The Interior Columbia Basin Review stratified road density levels as follows: none to very low (0 - .1 miles per square mile (m/m2), low (.1 - .7 m/m2), moderate (.7 – 1.7 m/m2), high (1.7 – 4.7 m/m2), or extremely high (4.7+ m/m2). About 51 percent of the Interior Columbia Basin currently supports road densities estimated at the moderate or above level (Quigley et al. 1996). Open road/trail densities in the analysis area are 7.88 miles per square mile; some of these are on steep ground not accessible by pickup trucks but are used by off road vehicles.

There are a total of 31 miles of roads/trails that are open in the analysis area. This reduces the habitat security and increases the potential for poaching. Many of the roads are used to access existing mining claims.

3.2.10.1 Threatened, Endangered and Sensitive Wildlife

The following Special Status species have potential habitat and are discussed in detail in Appendix M the Wildlife Specialist Report:

Townsend's big-eared bat (Corynorhinus townsendii): Sensitive (BLM OR)
Northern Goshawk (Accipiter gentilis): Sensitive (BLM OR)
Northern Pygmy Owl (Glaucidium gnoma): Sensitive (BLM OR)
Flammulated Owl (Otus flammeolus): Sensitive (BLM OR)
White-headed Woodpecker (Picoides albolarvatus): Sensitive (BLM OR)
Black-backed Woodpecker (Picoides arcticus): Sensitive (BLM OR)
Pygmy Nuthatch (Sitta pygmaea): Sensitive (BLM OR)
Fisher (Martes pennanti): Sensitive (BLM OR)

There were two juvenile goshawks sighted in the analysis area in summer 2002 surveys. It is assumed that there is a goshawk nest within the analysis area. The 1998 interim management direction provided by the BLM Oregon State Office (IM-OR-98-012); Northern Goshawk Management Guidelines, will be used when applying treatment prescriptions.

3.2.10.2 Big Game

Rocky Mountain elk and mule deer are species of special interest to public land users and, as such, are species with emphases in the RMP. The analysis area is located in the Murderer's Creek Wildlife Management Unit. Both species are present and use the analysis area for rutting, calving, and fawning. Approximately 85 percent of the analysis area is considered to be crucial mule deer winter range.

Dense cover and steep topography can increase the level of security and thus increase potential for use even in areas with higher road densities. Marginal thermal cover is defined as areas with canopy closure between 40 – 70 percent with optimal thermal cover being greater than 70 percent. Although not directly related, the denser the canopy cover the greater the potential to provide screening (hiding cover) on distant slopes. Greater canopy covers indicate multi strata canopy that provides ground level screening. Public lands in this area receive heavy recreational use and hunting pressure.

See Appendix M – the Wildlife Specialist Report for additional details.

3.2.11 Fisheries

Little Pine Creek is a fish-bearing stream on the east side of the project area. Species present in this stream are mid-Columbia Ecological Significant Unit (ESU) summer steelhead, listed as threatened under the Endangered Species Act (ESA) and Westslope Cutthroat trout.

Approximately ¼ mile of occupied summer steelhead spawning and rearing has been identified by Oregon Department of Fish and Wildlife (ODFW) on BLM administered lands. Field surveys in this area indicate the area has been impacted by historic and current placer mining. No current mining activity is impacting the present stream channel, however, there are active mining claims along this stream segment.

Historic mining heavily impacted the channel and adjacent riparian area. Mining impacts to the channel and riparian areas decrease upstream. Currently willows (Salix sp.), alder (Alnus sp.), black cottonwood (Populus trichocarpa) and red-osier dogwood (Cornus stolonifera) are the dominant riparian hardwood species. However, in most areas the dense pine and fir overstory cut off adequate sunlight from reaching these hardwoods, this leads to a decrease in vigor for these species as evidenced by their sparse foliage. Ponderosa pine, Douglas-fir and western juniper are also present on the uplands and drier sites within the riparian area. Based on field surveys, large wood did not play an important role in channel and floodplain development in this lower stream segment. Few large stumps were found and the current trees are less than 140 years old. The stream to the north of the project area is hardwood dominated with grass/shrub upland. Ponderosa pine and Douglas fir increase and are dominate south to the headwaters.

ODFW identified approximately 2½ miles of Westslope cutthroat trout spawning and rearing habitat in Little Pine Creek. The lower limit is ½ mile below BLM administered land with distribution upstream ¼ mile into the Strawberry Mountain Wilderness area of the Malheur National Forest. Approximately 1½ mile of spawning and rearing cutthroat habitat is on BLM administered lands. Although there is more large wood potential in this segment, the narrow valley shape limits the interaction of large wood for channel and floodplain development.

Historic and current mining activity and later agriculture development created diversions of Little Pine Creek water. Water rights currently exist from Little Pine Creek for both mining and irrigation.

Canyon Creek is a perennial fish-bearing stream marking the west side of the project boundary. U.S. Highway 395 parallels the creek on the east side. Historic and current mining evidence are present along the creek for approximately 2½ miles upstream of the town of Canyon City. Bureau of Land Management administers One and one-half miles of this segment. The project boundary is along the east side of the highway right of way. See Appendix N – the Fisheries Specialist Report for additional details.

3.2.12 Special Status Plants

No special status species were observed during surveys or are suspected in this unit. Special attention was given the rocky and riparian areas. Arrowleaf thelypody (*Thelypodium eucosmum)* populations south of the unit were found to be in full flower and therefore timing was appropriate for this species. Hayden's cymopteris (*Cympoteris nivalis)* and colonial luina (*Luina serpentine)* would have been observed if they had been in the unit. Correct habitat for any of the suspected species is not present in the project area. See Appendix O – the Botany Specialist Report for additional details.

3.2.13 Hydrology

The project area encompasses the headwaters of several perennial and intermittent stream channels. Whiskey Gulch, Canyon Creek, Byrams Gulch, Long Gulch, Rich Gulch, Little Pine Creek and several unnamed drainages on the north side of Little Canyon Mountain. Whiskey Gulch is a first order stream that flows northwest to its confluence with Canyon Creek on the south end of Canyon City. At the top of the mountain, ephemeral draws grade to intermittent channels. Gradients range from upwards of 50 percent slope near the top of Little Canyon Mountain to 15 to 20 percent slope in the lower reaches. Springs provide perennial flow for the last 3000 feet of Whiskey Gulch. Long Gulch drains a narrow sliver of the project area to the north and flows into Canyon Creek near Grant Union High School.

Little Pine Creek is a second order perennial stream originating on Canyon Mountain in the Strawberry Wilderness Area and draining into the mainstem John Day River at River Mile 250. The bankfull flow of Little Pine Creek at the lower boundary of this project area is estimated at 45 cfs. This estimate is based on field measurements and regional hydraulic geometry equations (Castro and Jackson, 2001). Annual runoff is estimated at 10 inches per year. This is based on annual water yield of gauged watersheds in the area.

Within the upstream portion of the project area Little Pine Creek is characterized by a narrow valley bottom. As in many of Little Canyon Mountain's watersheds, tailing piles of large cobble are scattered along Little Pine Creek's flood plains. Where mine tailings are mounded on Little Pine Creek's floodplain, the stream cuts an incised channel through the headwalls and piles of tailings. In entrenched channels, the depth, velocity, and erosive energy of flows are higher. These relatively straight sections consist of a series of step pools confined in a deep channel. Between these steeper, entrenched reaches, the channel flattens out. The stream has established a meander pattern with a narrow floodplain. The channel is shallower and accesses its floodplain more frequently.

Within the downstream end of the project area Little Pine Creek valley widens into an alluvial setting. Mine tailings completely bury the stream channel for several hundred feet. Summer surface flows disappear and flow subsurface under the tailings. It is evident from scour on top of the tailings that Little Pine Creek flows over these tailings in the winter months.

The stream is well shaded by young encroaching conifers and a diverse set of riparian vegetation. In the few places where sunlight reaches the forest floor, herbaceous vegetation is establishing along the lower gradient meanders.

Little Pine Creek has a limited ability to move the mine tailings strewn across its floodplain. Therefore, this disrupted stream channel flood flows are not capable of transporting and sorting the tailing materials in order to re-establish meanders across the valley bottom.

A century of wildfire suppression has changed the ponderosa pine and dry mixed conifer ecosystem on Little Canyon Mountain. Uncharacteristically dense watershed cover has altered the project area hydrology by intercepting and evaporating snow and other

precipitation. As a result, less water is available for uptake by vegetation or streamflow. In addition, the accumulation of fuels set up conditions for a stand replacement fire (see Effects of No-Action Alternative).

Both Little Pine Creek Watershed and Lower Canyon Creek Watershed have considerable withdrawal of water for the surrounding towns and rural communities. On Little Pine Creek, water rights are consistently regulated back to 1865 water rights by the Oregon Water Resources Department (OWRD). Shutoffs occur in mid to late July of almost every year. About one cfs is even ditched over from Dog Creek in an effort to increase the amount of water available for irrigation. Mid to late season, Little Pine Creek's water deficiency approaches 2 cfs (Rise 2002).

See Appendix P the Hydrologist Specialist Report for additional details.

3.2.14 Soils

Ninety percent of the soil types in the Little Canyon Mountain area have developed on hill and mountain slopes with a mean slope of 44 percent. The remaining ten percent, mostly in the north-eastern part of the project area, has formed on low relief, alluvial fans and fan terraces with a mean slope of 14 percent.

Hill and mountain slope soils are well drained, 12 to 40 inches deep to bedrock, and are loamy and clayey textured with 10 to 65 percent gravel and cobble sized rock fragments occurring through out the profile. Alluvial fan soils are well drained, greater than 60 inches deep to bedrock, and are mostly clayey textured with 15 to 50 percent gravel and cobble sized rock fragments throughout the profile. Soil pans can occur on the more stable parts of this landscape. Shallow soils are generally found on ridges and shoulder slopes of the project area. Rock outcrop can be found on the steeper parts of the landscape and also occurs on ridges and shoulder slopes.

All of the soils in this project area have dark surface horizons with 2 to 5 percent organic matter content. Soil biologic crusts of lichens and mosses are well developed primarily on the dryer bare slopes. These soils are expected to weather fire effects from moderate (116-520 btu's/sec/ft) fire line intensities.

Geologically unstable parent materials that would produce large mass movements have not been observed in this project area. This is due in part to the dryer climate, shallow soil depths to bedrock and geologic strike and dip planes being perpendicular with existing slopes. Areas with slopes greater than 70 percent tend to form bedrock cliff faces with colluvial talus slopes below. Dry ravel, especially on south aspects, could limit survivability of young trees planted on these slopes. Slight soil creep has been noted on deep, north to northeast facing slopes of 70 percent or more. White volcanic ash deposits can occasionally be found along the major alluvial drainages of the project area. See Appendix Q - the Soils Specialist Report for additional details.

3.2.15 Cultural

The study area contains a number of sites and features related to different eras of mining. These include: 1) the probable site of Marysville (1862-ca.1900), both the residential area (no longer existing) and the mines; 2) the site of Mountain View (1898-1930, no longer existing), consisting of standing structures (Ike Guker and Millar place's), associated trash scatters, and most of the associated mines; 3) the patented claim of the Great Northern Mine; 4) the Millar Place; 5) the head of Long Gulch and associated mines; and 6) the bulk of LCM and its mined landscape. Except for the patented claim of the Great Northern Mine, all locations mentioned above occur on BLM administered lands. Ditches, some associated with mining of 1862, are common throughout the lower north flank of LCM and Quartz Gulch. Lode mines are found from the top of LCM to the upper flanks on the north and east sides. Because mining activities have been continuous on LCM since 1862, most of the sites and features have had some type of impact or modification. Few if any of these sites or features retain a high level of integrity. At some point in the future, the Canyon Mining District should be assessed in its entirety to determine if features within the project area meet the criteria to be contributing factors for nomination to the National Register of Historic Places. During discussions with the Oregon SHPO (Curran 2002) about this project and its findings, it was determined that most of the mining features would not be eligible for nomination. At this point in time, the BLM will consider the main ditch (the Hillas Ditch) segment in the project area as the most important to the mining history, due in part to its relevance to the early mining period. See Appendix C – the Cultural Specialist Report for additional details.

Chapter 4
Analysis of Effects

This chapter is organized around the alternatives. The analysis of effects for each alternative is located within one section titled by alternative. This format was chosen so the reader can easily ascertain the effects of each alternative. In some instances effects or processes are very similar between alternatives. When this occurs these effects are described in section 4.1 General Effects, with the specific details located under the alternative section.

4.1 General Effects

4.1.1 Fuels

Stand exams were conducted on Little Canyon Mountain to provide vegetation fuels information and other data needs for the Little Canyon Mountain Prescribed Burn Environmental Assessment. Data collected included tree diameter, species, height, crown ratio (total portion of the tree that contains live crown), and surface fuel model.

The fuel models used for estimating fire behavior are primarily based on those developed by Albini (1976). These models, with input from subsequent research now comprise the Fire Behavior Models (or Surface Fuel Models). These models use the type and quantity of fine fuels that carry fire, and thus describe potential conditions at the head of a wildfire event. Fuel information needed to calculate models includes, but is not limited to, fuel loading (mass of fuel per unit area), fuel depth, and fuel particle density (lb/ft). Models may be individual, or fuels may be arranged in a combination across and area.

Based on field examinations, the majority of Little Canyon Mountain fell into a Fuel Model 2 category (over 75 percent), with a few small areas representing Fuel Model 9. This means that most of the project area is timbered, with grass and other understory materials carrying the fire. Fuel Model 9 represents areas that are timbered with some heavier, hardwood litter (downed woody debris).

All action alternatives would have an effect on reducing the fire hazard within the units that are treated. This is due to the removal of fuels in numerous size classes that would provide a reduction in surface fuels such as needle-cast and small shrubs, and a reduction in ladder fuels that allow a surface fire to climb into the tree crowns. The scale and effectiveness of the treatments would vary according to the prescriptions in each action alternative. Proposed treatments may lessen the risk – to varying degrees – of a catastrophic fire event occurring in the project area and extending into the community of Canyon City and nearby residences. Thinning trees reduces overall canopy cover and opens up the stands, reducing the risk of crown fire, however, thinning also allows for faster growth of young trees, which will result in crowded conditions if stand densities are not maintained into the future with additional mechanical or prescribed burn entries.

4.1.2 Entomology

Bark beetles are opportunistic and depend on reduced host vigor in order to be successful. As such, the effects of bark beetles are very readily managed through stand tending treatments that reduce stocking levels and promote better tree growth in the residual stand. The standard stocking level reduction to be applied is addressed in Cochran (1992) and Cochran and others (1994). In these publications the authors describe an "Upper Management Zone" (UMZ), a level of stocking above which density-related tree mortality is likely to occur. The threshold basal area that constitutes the "Upper Management Zone" for the LCM stands is 100 square feet per acre, as determined from stand examinations that included measurements of the recent radial growth of co-dominant trees. Stands with stocking densities above this level can be considered susceptible to infestation by bark beetles. Treated stands where the residual basal areas are below the UMZ of 100 square feet of basal area per acre are far less likely to experience mortality from bark beetles. As such, the degree to which the alternatives address the hazard reduction to bark beetles is a function of the number of treated acres where the residual basal area is brought below 100 square feet per acre.

Regardless of the alternative that is selected, it is important to be aware that there may still be some additional tree mortality occurring in the short term. Even though dead and dying trees are being targeted for removal in most of the action alternatives, some currently infested trees may be missed and may later discolor, giving the impression that trees continue to die in spite of the treatment. In addition, many of the residual trees remaining after treatment will have poor crowns and will require several years before they experience the benefits of thinning and before they can build resistance to bark beetle attack. During this time of vulnerability, some of these trees may be infested and die from beetles coming from the immediate or surrounding areas. Within five or ten years, the surviving residual trees should have sufficient resources to grow and be resistant to bark beetles as long as their basal areas remain below the threshold of 100 square feet per acre.

From the perspective of minimizing bark beetle populations, reductions in basal area that are far below the UMZ are not necessarily better than lesser reductions, although the more extreme treatments would allow more time to pass before the stands once again grow into a susceptible state.

4.1.3 Silvicultural Resources

All effects are discussed in detail by alternative.

4.1.4 Visual Resources

The Visual Resource Contrast Rating process (USDI BLM, 1986) is used by the BLM as a visual design tool in project design and as a project assessment tool during environmental review. It is a systematic process used to analyze potential visual impacts of proposed projects and activities. The degree to which a management activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing

landscape. The contrast rating system is a means for determining whether the proposed project conforms to approved VRM objectives and provides a means to identify mitigating measures that can be taken to minimize adverse visual impacts. Contrast ratings are required for proposed projects in highly sensitive areas or high impact projects.

Key observation points (KOPs) were selected to study the existing characteristic landscape and to analyze the affects of each alternative action. These points were selected as KOPs because they provide a variety of different angles and distances of observation, as seen from a range of likely observation points.

In all action alternatives logging methods may create soil disturbance that would be visible as dark brown patches or lines on the mountain. The visible soil disturbance would diminish with time as natural vegetation returned to the disturbed areas, and would probably be unnoticeable after three growing seasons.

4.1.5 Road Engineering and Transportation

All effects are discussed in detail by alternative.

4.1.6 Recreation and OHV Use

All effects are discussed in detail by alternative.

4.1.7 Mining and Minerals

The mineral resources primarily occur underground in veins and fluvial gravel deposits and would not be directly affected by issues relating to bark beetle infestation, fuel load, and wildland fire.

4.1.8 Range Management

All effects are discussed in detail by alternative.

4.1.9 Social and Economic

All effects are discussed in detail by alternative.

4.1.10 Wildlife

When comparing effects of human induced change it is important to have a basic understanding of the natural processes and effects. Wildlife populations have and will continue to be affected mainly by the local climate, vegetation, topography, competition, predation, and disturbance factors. The effects of human induced change related to silvicultural and other activities proposed in the alternatives will be measured against each other. Proposed actions associated with the alternatives will be viewed in the context of their potential for effects to the process and function related to wildlife habitat.

Wildlife habitats that are balanced, not to the reduction of any one species, will be better able to adjust to partial habitat reductions due to wildfires, windstorms, human activities, drought, flood, etc. The ability for broad scale resilience will increase with the number and size of watersheds approached in this manner.

For analytical purposes in determining effects, the amount of canopy cover was estimated and correlated to basal area as shown in Table 4.1:

Table 4.1

Basal Area	Estimated % Canopy Closure	Structural Definition
30-60	10-39	Open
60-120	40-69	Moderate
120+	70-100	Closed

Many wildlife species that inhabit Eastside (interior) forests and woodlands might be considered "associates" of specific forest communities, and are not often considered "obligates". As a result, Sallabanks et al. (2001) does not generally consider the distributional aspects of any of the Eastside (interior) forest and woodland habitats to be limiting for wildlife. Possible exceptions to this might exist for species that inhabit upland aspen and old-growth ponderosa pine, because of the patchy distribution of these habitats across the landscape. Species know to be associated with old-growth ponderosa pine include the white-headed woodpecker, white-breasted nuthatch, and flammulated owl. Table 4.2 displays trees and basal area per acre by tree size.

Table 4.2 Estimated Percent trees per acre and basal area per acre by tree size in the LCM analysis area.

Tree Size	% Total Trees Per Acre	% Total Basal Area Per Acre
Sapling /Pole 1-9" dbh	80	24
Small Tree 10-14" dbh	14	32
Medium Tree 15-19" dbh	<5	21
Large Tree 20-29" dbh	<2	19
Giant Tree 30" dbh	<1	4

4.1.10.1 Threatened and Endangered Species

The following Special Status species were evaluated but were considered to not have potential habitat in the analysis areas: Canada Lynx, Washington Ground Squirrel, Oregon Spotted Frog, Upland Sandpiper, Western Pond Turtle, Northern Leopard Frog, Cope's Giant Salamander, Tricolored Blackbird, Burrowing Owl, Pygmy Rabbit, Western Sage Grouse, Spotted Bat, Brazilian Free-Tailed Bat, Ferruginous Hawk, Columbia Sharp-

tailed Grouse, Yellow-Billed Cuckoo, and Streaked Horned Lark, Painted Turtle, Three-toed Woodpecker, Northern Bald Eagle, Peregrine Falcon.

The following Special Status species have potential habitat and are discussed in detail in Appendix M the Wildlife Specialist Report:

Townsend's big eared bat (*Corynorhinus townsendii*): Sensitive (BLM OR)
Northern Goshawk (*Accipiter gentilis*): Sensitive (BLM OR)
Northern Pygmy Owl (*Glaucidium gnoma*): Sensitive (BLM OR)
Flammulated Owl (*Otus flammeolus*): Sensitive (BLM OR)
White-headed Woodpecker (*Picoides albolarvatus*): Sensitive (BLM OR)
Black-backed Woodpecker (*Picoides arcticus*): Sensitive (BLM OR)
Pygmy Nuthatch (*Sitta pygmaea*): Sensitive (BLM OR)
Fisher (*Martes pennanti*): Sensitive (BLM OR)

There were two juvenile goshawks sighted in the analysis area in summer 2002 surveys. It is assumed that a goshawk nest exists within the analysis area.

Table 4.3 describes effects of listed and sensitive species for which habitat exists on Little Canyon Mountain.

Table 4.3 Summary of Conclusion of Effects to Listed and Special Status Species

Wildlife Species	Listing	Habitat Present	Effects
Northern bald eagle	threatened		
Canada Lynx	threatened		
Northern Spotted Owl	threatened		
Yellow-billed Cuckoo	federal candidate		
Washington Ground Squirrel	federal candidate		
Oregon Spotted Frog	federal candidate		
Northern Goshawk	sensitive	ã	MIIH
Ferruginous Hawk	sensitive		
American Perigrine Falcon	sensitive		
Flammulated Owl (BM)	sensitive	ã	MIIH
Northern Pygmy owl (BM)	sensitive	ã	MIIH
Burrowing Owl	sensitive		
White-headed Woodpecker	sensitive	ã	MIIH
Black-backed Woodpecker (BM)	sensitive	ã	MIIH
Three-Toed Woodpecker (BM)	sensitive	ã	MIIH
Pygmy Nuthatch (BM)	sensitive	ã	MIIH
Townsend's Big-eared Bat	sensitive	ã	MIIH
Fisher	sensitive	ã	MIIH
Columbian Sharp-tailed Grouse	sensitive		
Greater Sage Grouse	sensitive		
Harlequin Duck	sensitive		
Upland Sandpiper	sensitive		
Yellow Rail	sensitive		
Painted Turtle	sensitive		
Western Pond Turtle	sensitive		
Northern Leopard Frog	sensitive		
Cope's Giant Salamander	assessment		
Tricolored Blackbird (HP)	assessment		
Pygmy Rabbit	assessment		
Brazilian Free-Tailed Bat	assessment		
Spotted Bat	assessment		

(BM) = Blue Mountains area only (HP) = High Lava Plains Area only

Determination for Federally Listed and Proposed Species	*Determination for Special Status Species*
NE = No Effect NLAA = May Effect – Not Likely to Adversely Affect LAA* = May Effect – Likely to Adversely Affect BE = Beneficial Effect	NI = No Impact MIIH = May Impact Individuals or Habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species WIFV* = Will Impact Individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species BI = Beneficial Impact

** Trigger for a Significant Action As Defined in NEPA*

4.1.11 Fish

Effects on fisheries will not be discussed species by species. The similarity of aquatic habitat requirements for the four documented species is such that management actions will provide essential elements for either trout or salmon even though they have different life history forms. Redband and steelhead are resident and anadromous life forms of the same species and have the widest distribution in the basin. Westslope cutthroat are also a resident species with summer distribution limited to numerous headwater tributaries to the mainstem John Day River with winter migrations into the mainstem being documented. Migratory habitat for Chinook salmon in Canyon Creek would not be affected because the west project boundary is Highway 395 which serves to buffer potential project disturbances.

4.1.12 Hydrology

Management alternatives are not expected to result in excessive mass movements or erosion because the soils of Little Canyon Mountain are fairly rocky and stable. Therefore, the hydrologic analysis has focused on changes in the annual hydrograph, sedimentation from roads, and water quality.

The alternatives that alter canopy cover may slightly alter the annual hydrograph. Minimum net solar radiation occurs in the canopy range from 15 percent to 30 percent. For Little Canyon Mountain, it has been estimated that this canopy cover exists where the basal area ranges from 30 to 60. The areas thinned to this basal area can expect more snow accumulation and slower snowmelt. These changes will contribute greater water yield to the annual hydrograph.

A low intensity fire may still occur under most action alternatives. This would result in a temporary increase in available nitrogen that may affect water quality (Fitzgerald, 2002).

4.1.13 Soils

4.1.13.1 Compaction

Compaction includes both unit skid trails and OHV trails. Direct effects of soil compaction on the soil resource are decreased pore space, reduced aeration and permeability, destruction of plant cover, destruction of soil biotic crust. Indirect effects are increased surface water flow, increased erosion and sedimentation, rutting, rilling, reduced plant growth, reduction of organic matter production, and loss of diversity in the soil food web. Ectomycorrhizal fungi are strongly aerobic so soil compaction can negatively affect these organisms. Also, diversity of soil biotic organisms including fungi is decreased with soil compaction. Subsoiling can have a direct detrimental effect on fungi trying to grow in a compacted soil but more likely it will be beneficial in the long run due to the aeration produced. Compaction effects can last in surface and subsoil layers for an indefinite amount of time.

4.1.13.2 Intense Burns

Intense burns include severe burn wildfires and in-unit burns of hand piles and log landings. Hand pile diameters are generally 12 feet. The number of piles and surface disturbance is directly related to the amount of slash produced. Direct effects of intense burns on the soil resource are; decreased permeability due to change in soil structure and hydrophobicity; increased ash particle content from the burn, which could plug soil macropores adding to increased water runoff; loss of protective plant cover and loss of soil biotic crust which protect the soil surface from erosion; volatilization of soil nutrients mostly carbon, nitrogen, sulfur and phosphorus resulting in fertility loss; decreased in soil roughness due to the destruction of vegetative material and root mass; and increased number of flow paths for water and soil movement. Protective plant cover can be expected to regenerate in 2 to 5 years depending on the burn severity and proximity to seed sources. Loss of hydrophobicity is variable. In some cases the hydrophobic effects have dissipated in one year and in other cases the effects can remain for 10 years or more. Soil biotic crusts, especially the cyanobacteria, regenerate first, mosses and lichens take longer. Estimated regeneration time is two to 30 years. Soil types in the Little Canyon Mountain area are expected to weather fire effects from moderate (116-520 btu's/sec/ft) fire line intensities (Dyksterhuis, 1981).

Water Erosion Prediction Project (WEPP) (Elliot 2000) calculates the amount of sediment in tons per acres expected to move under set conditions. WEPP runs for Little Canyon Mountain have shown the following for an intense burn on slopes ranging from 10 to 50 percent with a 50 foot slope length, loam surface texture, with a 5 percent vegetative or surface cover, and 20 percent rock fragments within the soil. This is modeling erosion for a Ruddley loam - mapunit 38E. A maximum allowable ton per acre soil loss for a Ruddley loam is 2 tons per acre per year (Dyksterhuis 1981). From the table below it can be seen that a 3 year climate event return interval exceeds this amount.

Table 4.4 WEPP Erosion Run for an intense wildfire burn on a Ruddley loam – LCM map unit 38E

Return Period	Precipitation (in.)	Runoff (in.)	Erosion ($t\ ac^{-1}$)	Sediment ($t\ ac^{-1}$)
30 year	30.81	2.02	10.06	10.06
15 year	23.8	1.95	8.15	8.14
6 year	20.89	1.07	4.48	4.48
3 year	19.01	0.96	2.79	2.79
1.5 year	17.76	0.35	0.69	0.58
Average	18.79	0.69	2.31	2.31

The combined indirect effects of soil compaction and intense soil surface burn at 100 to 200 degrees Celsius with hydrophobic effects are increased runoff rate and decreased lag time during a precipitation event to the stream system (see Figure 4.1). This can produce 80 percent of the erosion and sediment input to the stream (Martin & Moody, 2002) and results in a loss of water quality and possible increase in down

stream flooding. This erosion and loss of water quality and flooding hazard could continue as long as the upland slopes remain bare and smooth, approximately two to five years.

4.1.14 Cultural Resources

Regardless of the alternative chosen, the design measures to protect cultural resources will be the same. Throughout the various alternatives (except for the No Action Alternative) fuels reduction activities are similar in their approach but different in their emphasis and distribution. Thus, the recommended design measures in regards to the Cultural Resource program will be the same across each of the alternatives. (See Chapter 2 – Design Features Common to All Action Alternatives).

4.1.15 Air Quality

Smoke management strategies are becoming more and more complex as fire is used in greater amounts to preserve, restore or maintain forest health and reduce hazardous fuels. Smoke from prescribed burning is competing with smoke from agricultural burning, residential wood consumption and smoke from neighboring agencies. The cumulative smoke impacts cross state, federal and private lands, affect regional haze, visibility and human health. Implementation of the Clean Air Act, National Ambient Air Quality Standards (NAAQS) and Regional Haze Rules is requiring agencies to use smoke management modeling programs and real-time emission tracking to minimize cumulative impacts (Ferguson et al., 2001).

Pollutants are formed when biomass is burned, or consumed, by fire. Approximately half of the consumption occurs in the initial flaming combustion stage, with the rest occurring during the smoldering stage of burning. In general, biomass production varies widely between fires, vegetation types and regions. Fuel consumption in slash piles eliminates approximately 90-95 percent of the woody fuels, as well as the duff layer directly below the piles. For the most part, the process is relatively efficient.

Particulate matter (PM) is one of the most important pollutants that can be emitted from prescribed fire. Particulate matter can not only reduce visibility, but also serve as an absorption surface for harmful gases. A Modification and Validation of Fuel Consumption Model (CONSUME) was used to determine the particulate emissions from pile burning in the project area. The software predicts the amount of fuel consumption and emissions from the burning of logged units, piled debris, and natural fuels based on weather data, the amount and fuel moisture of fuels, and a number of other factors. Using these predictions, resource managers are better able to determine when and where to conduct a prescribed burn or pile burn to achieve desired objectives while reducing impacts on other resources.

There are two primary categories of PM emissions: PM 2.5 (fine particles) and PM 10 (inhalable particles). The majority of PM 2.5 ranges between 0.1 and 0.3 micrometers and consist primarily of organic hydrocarbons. These sizes are capable of intercepting visible light and, as a result, are very efficient in reducing overall visibility. The

majority of PM 2.5 emissions come from higher intensity fires where the proportion of PM 2.5 in smoke may be as great as 90 percent.

Inhalable particles have diameters less than 10 micrometers and are more closely related to health, rather than visibility, effects. The annual standard for average PM 10 concentration in ambient air is 50 micrograms/cubic meter, with a 24-hour standard of 150 micrograms/cubic meter. Controls for PM 10 emissions include all sources of emissions, so pile burning, which often occurs during colder weather, would need to take into account residential wood combustion as well.

A burn plan would be initiated prior to any pile burning in the project area. Based on a variety of environmental factors including weather, humidity, fuel moisture and the number of piles, a "prescription" would be determined that would describe the conditions under which pile burning could occur. These prescriptions are designed not only to control the intensity of any burns and maintain safe conditions, but also to stay below PM 10 emission standards. In the event that an area exceeds the PM 10 standard, the burn plan also contains measures to control and extinguish the prescribed fire. In addition, the burn plan would be designed to comply with all applicable State and Federal air quality laws and regulations, and would be coordinated with the appropriate air quality regulating agencies.

The environmental consequences of pile burning were analyzed for Alternative D, which is expected to have the greatest number of piles in the project area. The number of piles of slash is based on the concept of a uniform treatment to a low basal area across the entire project area. Piles would be round in shape, with a width of approximately 6.0 feet and a height of 4.0 feet. Piles would be relatively clean (no soil). For alternative D, we estimated 100 piles per acre (for approximately 20,000 piles). This number is considered high, even for the uniform treatment alternative; however, it allows us to analyze a worst-case scenario. In many cases, whole tree yarding would be used and the overall number of piles would be reduced.

Burning would commence under atmospheric conditions, which would limit smoke intrusion into nearby residential areas, as well as major roads. Based on outputs from CONSUME, PM 10 productions would be 11.84 tons for the entire project area, assuming an average of 100 piles/acre. PM 2.5 emissions would be 10.31 tons for the entire project area. Both PM 10 and PM 2.5 emissions produced by pile burning would be substantially less than emissions produced by a wildfire burning over the same area.

4.2 Alternative A

4.2.1 Fuels

The current threat of wildfire to the homes on Little Canyon Mountain and the community of Canyon City is high. Heavy contiguous fuels on the hillside offer no natural breaks or opportunities to slow or stop a fast moving fire under average to severe summer weather conditions. At the same time, the threat of fire starting on private lands and moving upslope onto the public lands is even higher with the public lands above the private. Some

work has begun on the private lands adjacent to the boundary to provide a fuel break, but more work is needed on both sides of the property line.

Potential fire behavior is analyzed based on high (90th percentile) and severe (97th percentile) summer weather conditions (see glossary). The likelihood that a fire, if it started under these weather and fuel moisture conditions, would turn into either a passive crown fire (individual trees torching) or an active crown fire (sustained fire in the canopy) was modeled. Given the present vegetative conditions on LCM if a fire started under the 90th or 97th percentile weather and fuel moisture conditions a sampling of specific plot data shows that active crown fire would result in seven out of ten plots. One plot would exhibit passive crown fire and one plot would exhibit surface fire. The 90th and 97th percentile refer to extreme weather conditions that could occur within the 120-day fire season. In other words, 90 percent of the time during the fire season, weather would be less extreme than the 12 days that meet or exceed specified 90th percentile conditions. In the same fire season, there are only four days that meet or exceed 97th percentile conditions.

In Alternative A no stand treatments would occur beyond the development of the 70-acre fuel break along the north side of the project area. The increased risk of catastrophic wildfire would continue. Fuels would continue to accumulate over time because the rate of fuel deposition is more rapid than the decay rate in this dry environment. In the event of a wildfire, these concentrations of heavy fuels would increase fire behavior and fire intensity.

For the first five years, more fine surface fuels would accumulate as larger trees succumbed to insect infection. This would serve to increase the continuity of surface fuels, feeding fire behavior, and increasing rate of spread and flame length. Branch wood from dead trees would fall and accumulate on the ground, also adding to fire intensity.

Based on estimates from the entomologist, in ten years trees killed by bark beetles would begin to fall, creating openings in which ladder fuel growth would accelerate. These areas would also contain the large branch wood and logs from the fallen trees. The openings would actually serve to add further chances for crown fire initiation because they would add to existing ladder fuel loads and increase energy output (measured by flame length).

As a result of increased tree mortality from beetle infestations, more intense, rapid burning would be expected. This would be caused initially (1-5 years) by the increase in surface fuels (needles, small branches), and subsequently (5-10 years) by the increase in downed woody debris (branch and downed log). As fuels continued to accumulate, the site would create more hazardous conditions for suppression forces by increasing fire behavior and intensity. As a result, the chance that fire behavior would exceed suppression activities would increase over time.

4.2.2 Entomology

Much of the tree mortality has occurred in the past two years, and the population of bark beetles is building up in the area. As such, additional trees are very likely to be infested and killed next year and in subsequent years until the end of the current

drought period. It is difficult to predict how many trees are likely to die, but an additional loss of two to four times the current level of tree mortality is a potential.

The "thinning" effect produced by the bark beetle infestation will create openings in the stand that will provide some diversity and will cause the release of understory shrubs and non-host trees (Douglas-fir).

There has been and will continue to be a significant increase in dead fuels resulting from the bark beetle-caused mortality. Dead trees can be expected to remain standing for about ten years, on average, and over time there will be an increase in down wood.

Physical evidence shows that insect damage has occurred in trees of all sizes within this LCM project area. Insects attack stressed trees regardless of size. The situation on LCM is somewhat unique. The Ips beetle is attacking the smaller tops of the larger diameter trees. As a result, many large trees have dead tops (upper 1/2 to 2/3 of crown). Since these larger trees are further stressed by their dead tops, the turpentine beetle is attacking at their bases and the western and mountain pine beetles are infecting the trees at mid bole. Within this stand it is common to find the large trees infected by up to three of the four known beetles.

In addition, the forest ecosystem would be altered extensively by the alteration of stand structure and continuity. The many openings already created by insect damage would eventually grow in size and create an insect killed band across the lower slope of the mountain. In the long term (5 years plus) this insect infestation would be expected to expand up the mountain as well as to the east and west.

4.2.3 Silvicultural Resources

By allowing insects to do the density control, there is a risk of losing most of the forest stand (20-50 percent), including trees of all sizes, to insects and possibly catastrophic wildfire.

Insect damage would continue to expand. "Overstocked stands result in moisture stress in the normal summer drought period and make stands highly susceptible to bark beetles" (Quigley and Arbelbide 1997)."When bark beetle mortality reduces stand density in unthinned stands…some of the best trees are lost, and the mortality often occurs in clumps, resulting in uneven distribution of growing space among remaining trees" (Cochran & Barrett 1999).

Many of the trees that appear green throughout the entire stand are exhibiting symptoms of stress (drought, competition, etc.). Some trees are retaining only 1-2 years of needles when they should be retaining 4-5 years. "Normally a healthy ponderosa pine retains 4-5 years worth of needles. Every fall the oldest needles will die and turn brown. Every spring a new compliment is produced. This is the normal process." (Wilson 1990). These trees are under stress and are highly subject to the expansion of the current insect epidemic. According to the most recent stand exam (9/20/02), the growth of the trees in this stand is severely stressed. Trees are currently growing at the rate of 20-50 growth rings per inch. Less than

13 growth rings per inch is ideal for stand (tree) vigor and, therefore, insect control (See Appendix E).

Insect thinning would kill randomly in patches and would affect trees of all sizes.

"A catastrophic designation will require prompt action to recover merchantable wood fiber and prevent additional damage, or to reduce wildfire potential" (Schmitt and Scott 1993). No treatment inside the planning area boundary would leave the area acres to passive management. "If we continue the current passive management approach, forest-health conditions can be expected to deteriorate, and forests will continue to be subject to high-severity wildfires, with concomitant damage to watersheds, fish and wildlife habitat, homes and communities. Therefore, active management within a forest sustainability context is needed" (Fitzgerald 2002).

4.2.4 Visual Resources

The affects to visual resources of taking no management action include 1) a likely increase in insect-infested ponderosa pine on LCM, and 2) the possibility of a stand-replacing fire. If no action is taken to treat the current insect infestation, it would likely spread to additional ponderosa pine, resulting in an increase in dead and dying trees. As a tree is stressed due to insect infestation, the needles first take on a yellow tinge, then turn to a reddish-brown color as the tree dies. Next the needles fall from the tree, leaving a brown colored snag, until the bark falls from the tree, at which time the snag appears light grey in color. Eventually the snag falls to the ground.

It is difficult to predict how many trees would ultimately be infected if no action were taken to control the current insect infestation. The reddish-brown trees that are visible are already dead and will likely lose their needles within a year or two. Trees that are currently stressed by insects, but still living, are indicated by yellow-tinged needles. The yellow needles are not visible when observed from a distance. The current extent of stressed trees is approximately two to three times larger than extent of visible reddish-brown dead trees. If all of the stressed trees were to die, the total area of dead trees would be enlarged two to three times beyond the current area of visible dead trees. If new trees become infected by insects, they may also begin the dying cycle, further enlarging the area of dead trees.

The dead ponderosa pine (reddish-brown needles), occur in clusters or horizontal bands at various elevations of LCM. Where an infestation occurs in a stand dominated by ponderosa pine, an opening in the continuous texture of the forest canopy would eventually appear, introducing a new shape or form into the characteristic landscape. Where these openings occur at lower elevations or on flatter ground, they would be less visible. Where they occur on steep slopes or near ridgelines, the openings would be more noticeable. In areas of mixed tree species, the Douglas-fir would be unaffected by insects and would remain standing, creating visible spaces between trees, rather than openings. Where openings or spaces in the canopy occur, the ground color would be visible through the snags (a light green in spring, gold in summer and fall, and white of snow in winter) and a coarser vegetative texture would result. Spaces between trees and irregular openings in the forest would likely repeat the form color and texture currently visible in burn areas on the Canyon

Mountain ridge, behind LCM. Openings on flatter terrain near the base of LCM would repeat the color and texture of the low hills visible in the foreground, where past vegetative management activities are evident. As open areas are created due to dead trees, new seedlings would grow in the openings, lessening the visual contrast of the openings over time. If no action were taken to control the current insect infestation, spaces between trees and dead tree openings would likely result in a weak to moderate degree of visual contrast in form, color and texture when compared with the characteristic landscape. The degree of contrast would be weak if the insect infestation did not expand beyond currently infected trees, and moderate if the extent of the insect infestation increased dramatically in the future.

If no action is taken to reduce the risk of a stand-replacing fire, the fire risk would remain high. If a stand-replacing fire were to occur, it would highly alter the characteristic landscape of LCM. Immediately after the fire, both the affects of the fire and the affects of fire suppression efforts would be visible. It is not known what vegetative species would grow on LCM after the fire, or how long re-growth would take. While it is not possible to describe the specific visual changes expected following a major wildfire, the changes would be expected to somewhat resemble those created by a previous fire on Canyon Mountain ridge within the Strawberry Mountain Wilderness. However, in the case of LCM, active efforts would be taken to suppress the fire. The combined visual effect of a stand-replacing fire and rigorous fire suppression efforts, including the potential use of dozer firebreaks along ridgelines, would likely result in a strong visual contrast in the elements of form, line, color and texture when compared with the characteristic landscape.

4.2.5 Road Engineering and Transportation

Under this alternative roads in the area will remain in their present condition. The road system will suffer further degradation due to increased use, both recreational and commercial users, and little or no maintenance. Without maintenance the road will eventually become unusable to all but very high clearance vehicles or motorcycles.

4.2.6 Recreation and OHV Use

Currently Little Canyon Mountain is classified as “open”, which means that motorized vehicles are allowed to drive cross-country as well as on any existing routes. There are no limitations to motorized recreationists. This type of land allocation produces many different potential impacts to other resources.

OHV users have the potential to disturb wildlife, impact soils and damage sensitive riparian sites.

Cross-country travel by OHV users also has the potential to disturb archeological sites. OHV riders currently use some of the historic mining ditches as routes. In some instances, this has the potential to compromise the integrity of historic sites.

The routes that currently exist were not designed or laid out to prevent erosion or sedimentation. Currently water run-off and OHV tire spin combine to create ruts in the steep trails. As ruts get worse and trails become nonnegotiable, riders continue to

move to the side of the trail, widening the trail and increasing the potential impacts. In some cases, old routes may be abandoned and new routes created to go to the same location.

Garbage dumping is another problem that would continue. The presence of garbage tends to encourage more garbage dumping and would be expected to increase in this area without attention.

A catastrophic fire would, in some cases, obliterate current routes because some are defined by a lack of vegetation. If there were no vegetation (shrubs, grasses, etc.) across the landscape some routes would disappear. However, the lack of vegetation could also promote new OHV routes. In some areas, the reason there are no routes currently is simply because there was too much vegetation to navigate through. If the vegetation were removed, sight distance would be opened up and OHV users would be able to see more areas that they could traverse.

Over time it is likely that there would be a substantial amount of erosion, several miles of new routes and many more parallel routes, all of which would be used by substantially more riders than there are currently.

4.2.7 Mining and Minerals

Bark beetles would continue to kill trees and substantially reduce or eliminate timber resources for mining-related use on claims. In addition, increasing dead and down fuels would further increase the risk of fire damage to timber resources, mining-related structures and equipment and increase the probability of lost production time. However, should a stand-replacement fire occur, it is possible for the ground exposure caused by fire and suppression activities to lead to more economic mineral discoveries.

4.2.8 Range Management

Under this alternative range management will remain the same.

4.2.9 Social and Economic

Current conditions would remain on the mountain. Mining would continue to occur at its present levels. The main access road would continue to degrade from its already existing condition, further increasing the difficulty and risk of traversing its length.

Forest conditions would continue to be overstocked and the insect infestation would continue to infect trees on the slopes of Little Canyon Mountain and likely move across the property line into private and other public lands. Red topped trees would be more noticeable in the local backdrop. As these trees lose their needle grey snags would remain. The canopy would become more open as trees died and Little Canyon Mountain would come to look more similar to its surrounding areas.

The high risk of catastrophic fire to the local communities and homes would remain.

Recreational use both legal and illegal would continue. No attempt would be made to clean the garbage from the pit area nor keep the area free from this use in the future.

The most substantial impact as result of No Action to the social environment is the lack of trust that will be promoted by the government to its constituents that have raised a need and concern. The current era is one of substantial mistrust of government, especially in eastern Oregon counties such as Grant County. A recent initiative was passed on a local ballot in Grant County for the local citizens to take over management of the public lands in their area primarily due to the lack of management and action exhibited by the federal government agencies with regard to resource management.

Allowing the resource conditions to continue to degrade and continue to increase the threat to local life and property will not improve the working relationship the BLM has with its constituents in this area.

4.2.10 Wildlife

Table 4.5 shows the estimated number of acres in the LCM analysis area by basal area and canopy closure.

Table 4.5 – Estimated acres by basal area and canopy closure.

Basal Area	Estimated % Canopy Closure	Structural Definition	Estimated Number of Acres	Percent of Total
10-60	10-39	Open	721	29
60-120	40-69	Moderate	805	32
120+	70-100	Closed	956	39

The number of acres in each forest structural class is relatively evenly distributed in the LCM analysis area, but because of the high percentage of trees per acre in the sapling/pole and small tree size class (+/- 94 percent), competition between tree species and fuel loading is causing reduced tree vigor and an increased risk for intense wildfires.

The reduced vigor associated with dense forest stands, changes in forest composition, and the attendant mortality due to competition and infestation by insects and diseases, add up to a mixed blessing for certain wildlife groups, notably the cavity nesters and down wood associates. Abundant foods are available in the form of insects, as are numerous sites for cavity construction. The negative aspect is that this condition is conducive to high-intensity wildfires, which may eliminate habitat for many species (Rochelle 2002).

Failure to reduce fuel loads will increase the potential for an intense burn in the analysis area. As described by Rochelle (2002), the effect of fire is to change the structural stage, at the expense of some species and to the benefit of others. These changes result in “winners” and “losers” with respect to the suitability of habitat. In

the case of stand replacement fire, the forest is returned to the grass-forb stage, which favors ground and shrub nesting species, weed and grass eaters, and grazers and browsers. Specific examples include many neotropical migrant birds (Saab and Dudley 1998), and many species of rodents. To the extent that snags remain, cavity nesting species associated with open habitats will also be present. While larger species such as black bear, deer and elk benefit from the enhanced forage conditions in early structural stages. They also have some requirement for cover in older stages as reflected in their larger home ranges. While early successional species benefit, wildlife species associated with later stages of forest development are negatively affected. Conifer seed-eaters such as tree squirrels, foliage feeders such as warblers are examples of species whose habitat may be locally eliminated with the loss of older forests.

Snags and down wood may be consumed by prescribed fire. This should be partially offset by the creation of new snags and down wood due to fire-killed trees. The effect of fire on snag retention would likely result in a higher number of hard snags, with a concurrent reduction in soft and hollow snag habitat. Because of anticipated low fire intensity, it is also likely that while large existing snags may be consumed by fire, the snags created by fire would tend to be in smaller size classes (less than 18 - inch dbh) due to the vulnerability to fire mortality of smaller thinner barked trees.

Because of high road densities, big game would benefit from increased hiding cover and decreased site distance from roads in the short term. When an intense burn occurs in the area at some point in the future, this would be foregone and much of the hiding cover would be consumed in the fire.

4.2.11 Fish

The existing condition and improving channel function would continue. Stand structure would continue to be complex with a high risk of stand replacement fires caused by overstocked stands that are susceptible to insect and disease. Stream shading, large wood recruitment, pool frequency and other aquatic habitat or channel structure would change with natural processes. Changes to channel function and morphology would change by increasing pool volume and numbers in the long term as large wood is recruited to the stream and vegetation trends to a climax stage.

This alternative would have no impact on individual steelhead or cutthroat trout and presently occupied habitat. Sediments from roads would continue to enter the streams. As a result, aquatic habitat potential would remain static or degrade slightly and continue to affect fish populations.

Allowing the trend of increasing ladder and surface fuel to continue would place fish habitat at risk because of the potential for high intensity stand replacement wildfires. Short-term water temperature increases would be expected from exposed stream courses. As a wildfire moves through Riparian Habitat Conservation Areas (RHCA), lethal temperatures could be reached causing immediate fish mortality. This impact is expected to be local in nature, confined to the high intensity fire area and for a short distance immediately downstream. Adjacent areas of refugia would serve to harbor individuals that could repopulate the area over time.

Riparian roads provide access for unauthorized woodcutting that will reduce recruitment of large wood to the channel and damage to riparian vegetation. These roads and/or crossings are causing channelized flows that carry sediment, which increases turbidity, cobble embeddedness and reduces pool quality.

4.2.12 Hydrology

Without vegetation treatment on LCM the potential for catastrophic fire is greatly increased. A high intensity fire on Little Canyon Mountain would reduce infiltration, decrease interception, increase evapo-transporation, and disrupt the subsurface movement of water. It would decrease condition of the already disturbed watersheds.

4.2.12.1 Annual Hydrograph

A wildfire would drastically reduce interception of precipitation and result in increased soil erosion, peak flows, and water yield. Most of the vegetative canopy and litter can be lost completely in severe fires. This results in comparatively less interception of precipitation. The interception of precipitation is important in preventing soil erosion and balancing the amount of runoff.

When a wildfire removes watershed cover, annual runoff increases, and the annual hydrograph changes. A high intensity fire can alter the seasonal distribution of runoff by reducing cover and by decreasing evapotranspiration. During summer rain events, the reduced timber basal area and litter cover reduces infiltration and interception. As a result, more water leaves the watershed as runoff and less water leaves the watershed as evapotranspiration.

A forest fire would result in increased snowmelt, which generates spring runoff in this area. As forest cover decreases, the solar radiation at the snow pack surface is increased. The snowpack in these open areas also tends to melt earlier than in surrounding forested areas. (Troendle 1984) Runoff may occur one to two months earlier following a severe wildfire, peak flows may be higher and the watershed may be more prone to flash floods (Helvey 1971) (Helvey 1980) (Anderson 1976).

4.2.12.2 Roads

Little Canyon Mountain's proximity to Canyon City and several private homes may exacerbate feelings of desperation and result in excessive land disturbance with heavy equipment during fire suppression activities. Heavy equipment trails increase erosion rates and expand the drainage network.

Studies suggest that the effect of roads on a basin streamflow is generally smaller than the effect of forest cutting. This is primarily due to the fact that the area occupied by roads is much less than that occupied by harvest operations. On the other hand, hydrologic recovery after road building takes much longer than after forest harvest because roads modify physical hydrologic pathways that affect the routing of flow through the watershed. The magnitude of the effects of roads depends

on their geomorphic setting, drainage design, and the proportion of the watershed that they cover (Gucinski 2000).

4.2.12.3 Water Quality

After fires, nitrates are highly mobile. Most studies of forest disturbances show increases in nitrates (Robichaud, 1999).

Under the no-action alternative, a fire on Little Canyon Mountain is likely to be severe. A severe wildfire that consumes much of the surface organic layer will cause a temporary increase in available nitrogen and other nutrients of greater magnitude than the historic low severity fires. Stand-replacement wildfires remove streamside vegetation that shade streams from solar radiation. The loss of forest canopy and riparian vegetation from wildfire has been shown to increase stream temperatures in forested ecosystems.

4.2.13 Soils

Presently, in-unit soil erosion is not a concern for the project area. However, erosion from non-maintained natural surfaced roads and trails is a concern in the project area (about 23 miles). The direct effects of the existing road system in the LCM area are that the roads would continue to provide unrestricted paths for concentrated water flow and erosion. There are no erosion control measures installed at this time. Soil disturbance and compaction can be expected to increase due to increased OHV use. The old mining ditches have not been kept up. Water has been diverted into these ditches and where breaches have occurred, concentrated water flow has caused gullies. Existing water diversions also have the same problem when they are not maintained. In some cases, these ditches provide water for creating spots for recreational mud running.

Road access to existing mining claims that presently do not have roads built to them can be expected to increase in the future. Soil displacement from surface mining disturbances can directly affect the loss of topsoil, organic matter and soil nutrients. Indirect effects of soil displacement are decreased fertility for establishing a protective plant cover and increased weed infestations.

Past hydraulic mining activities have disturbed and caused soil displacement on 206 acres of the LCM project area (less than 10 percent of the project area). Trees and shrubs are slowly re-vegetating these disturbed areas, grass cover is sparse. The direct effect is a destruction of plant cover, loss of top soil, reduced soil productivity, redistribution of sediment, and disruption of the natural stream course. Indirect effects are creation of steep slopes and cuts for OHV's to play on, and places to dump garbage into.

Intense wild fires generally have a negative impact on the soil resource because the reduction in protective cover increases the risk of erosion and sedimentation to streams. Organic matter and soil nutrients may volatilize due to high soil temperatures.

Erosion and sedimentation from the existing road network in the project area will continue to grow. Disturbance from existing mining activity will continue to occur.

OHV use can be expected to expand, increasing soil compaction, erosion and rutting on OHV trails. The probability of intense wildfire will continue to increase due to high stand density and increased number of beetle kill trees. With the increased risk of wild fire comes the increased risk of loss of soil productivity. Juniper canopy will continue to increase reducing the shrub and grass under story, increasing the erosion potential.

4.2.14 Cultural Resources

The individual features and sites existing within the project area do not appear to contain sufficient integrity or character to be substantial within the scope of the project. A catastrophic fire would eliminate some isolated and degraded remnants of later mining activity, including the Ike Guker home complex, but it is not important structurally or relevant to the events surrounding this colorful character. Continued artifact collecting can remove bits of information relevant to post 1900 mining activity but documentation is abundant for this period of time. Earlier trash is not evident within the project area and was probably removed or destroyed by subsequent and on-going mining activity.

4.3 Alternative B

4.3.1 Fuels

This alternative would treat and establish a fuel break up to, but not exceeding, 1000 feet inside the project boundary. Based on restrictions provided in the alternative only 225 acres would be treated, located in the northeast/east sections of the proposed project area. Within these 225 acres, trees would be thinned from below up to 12 inches diameter at breast height (DBH). Due to limitations on treatment in unroaded areas, this alternative would not treat acres nearest Canyon City or the residences that border public lands. As a result, this alternative is not expected to have much of an effect on reducing the threat of an unplanned wildfire event to Canyon City. The Wildland Urban Interface Zone would not be able to be managed for surface fire behavior in this alternative.

This alternative, like the No Action Alternative, would not target dead and dying beetle-infested trees for removal, unless they were removed as part of the thinning from below process. Over time, as these trees died, dead and down fuels would accumulate in the project area, leading to more intense fire behavior in the event that a fire started. This would be caused initially by the increase in surface fuels (needles, small branches), and subsequently by the increase in downed woody debris (branches and downed logs). As fuels continued to accumulate, the site would create more hazardous conditions for suppression forces by increasing fire behavior and intensity. As a result, the chance that fire behavior would exceed suppression activities would increase over time.

The average basal area prior to action in the area available to treat is approximately 142 BA. Following treatment, the basal area in the treated area is an average of 111 BA. Basal areas on all other plots would remain the same as the No Action Alternative.

Predicted fire behavior in the treated stands would change from an average of 34 percent of the area initiating crown fire under 97th percentile conditions to 17 percent of the of 225 acres initiating crown fire under 97th percentile conditions. Fire behavior in the rest of the area would remain the same as the No Action Alternative.

The combination of heavy, contiguous fuels, excessive fuel loads and dense stand conditions would continue to threaten the safety of nearby communities, as well as the safety of fire fighters protecting the area. In the lower elevations on the Canyon City side of the project area, beetle induced mortality would continue to cause fuel accumulations, capable of creating intense fire behavior. Ladder fuels, including small trees, low branches and shrubs would continue to be abundant in the majority of the project area, generating opportunities for surface fires to climb into the crowns. Effective fire suppression would remain a challenge, and firefighter safety would remain a concern due to the potential for extreme fire behavior.

4.3.2 Entomology

Alternative B, by limiting the treatable acres to 225, and by setting a size limit on the trees to be removed, does very little to reduce stand vulnerability to bark beetle depredation.

4.3.3 Silvicultural Resources

Treating only 225 acres within the 1000 feet inside the boundary would insufficiently address the fire hazard and insect epidemic that exists throughout the project area. Effects would be similar to those described in Alternative A.

Basal areas outside the 1000' treatment area would range from 0 to 222 square feet per acre.

Removing trees no greater than 12 inches DBH would avoid the opportunity to effectively control the insect epidemic. The many large as well as small pockets of dead and infected trees would continue to increase in size and would continue to join together to create an insect infested east/west band across the lower to mid slope of the mountain. Scattered pockets are established higher on the mountain as well as to the east and west. Eventually these pockets would join and the insect epidemic could be four fold within the next 1-2 years.

Left partially treated (trees less than 12 inches DBH), this LCM project area would be susceptible to higher insect mortalities and result in higher risks to slash loads, standing dead tree fuels, and catastrophic wildfires. "With high ground fuels and high tree densities, these dry forests are now much more likely to have severe fires" (PNW 2002). Thinning trees less than 12 inches DBH would be a thin from below operation. "Only three percent of the acres receiving a Thin-from-Below treatment would still have a low fire hazard rating 30 years later" (Fiedler et al. 2001).

Approximately 60 percent of the commercial size trees within this stand are 12 inches or less DBH (Appendix F). Thinning only these trees would be an ineffective

treatment of the insect epidemic for this stand. Since many of the insect infested trees on LCM are the larger over story ponderosa pine trees, trees of all sizes would continue to be lost in the future (Appendix F).

"Our evaluation of crown fire hazard following treatment shows that these small tree removal prescriptions do not achieve their stated objectives" (Fiedler et al. 2001). "Stands experiencing a mountain pine beetle outbreak should be promptly harvested to avoid building an even greater population of beetles" (PNW 1991). Therefore, a comprehensive stand treatment prescription "is clearly superior to prescriptions that focus only on removing small trees" (Fieldler et al. 2001). "While removing small trees is a necessary part of any effort to reduce hazard, this analysis clearly shows that it is not sufficient." "In addition, removing late-successional species and reducing density sufficiently to induce seral species regeneration (and enhance sustainability) commonly requires cutting some medium-sized and larger trees with commercial value". "Furthermore, the hazard reduction effects are longer lasting, with over 70 percent of treated stands remaining in a low hazard fire condition 30 years after treatment" (Fiedler et al. 2001).

4.3.4 Visual Resources

Creating a fuel break up to 1,000 feet wide between BLM and private lands by thinning while leaving trees greater than 12 inches DBH, would result in little or no contrast in the existing characteristic landscape. This is due to the small size of the area to be treated, the minor degree of thinning proposed (leaving trees greater than12 inches DBH), and the treatment areas being partially-obscured from view.

The treatment area located at the base of LCM is partially obscured, to varying degrees by low hills in the foreground. The treatment areas located at the base of LCM are adjacent to private lands, most of which have been altered with some sort of vegetative treatment, such as juniper cutting, selective harvest of ponderosa pine and Douglas-fir, or total clearing of trees and shrubs for agricultural purposes. Minor thinning of public lands immediately adjacent to previously treated private lands would result in little contrast, because if the thinning is noticeable at all, it would blend in with the color and texture of the adjacent private lands. In addition, thinning on flatter terrain near the base of LCM would be less visible than thinning on steeper slopes. The treatment area located along the northwest ridge of Quartz Gulch would be visible, however it would appear in the background, at too great a distance to attract attention.

Creating a fuel break up to 1,000 feet wide between BLM and private lands would likely have little direct effect on visual resources. The degree of visual contrast to form, line, color and texture would be none to weak when compared with the characteristic landscape. Alternative B would meet Class II VRM objectives in all four elements.

However, in this alternative, no action would be taken to control the current insect infestation or reduce the risk of stand-replacing fire. If no action is taken to treat the current insect infestation, the infestation would likely spread to additional trees, resulting in an increase in dead and dying trees. The resulting loss of canopy cover would create visible spaces and openings in the existing vegetative cover, as

described in the no action alternative. If no action is taken to reduce the risk of a stand-replacing fire, the fire risk will remain high. If a stand-replacing fire and rigorous fire suppression tactics were to occur, it would highly alter the characteristic landscape as described in the no action alternative.

4.3.5 Road Engineering and Transportation

This alternative will have the same detrimental effects on the road system as described under Alternative A.

4.3.6 Recreation and OHV Use

The John Day Resource Management Plan designated the Little Canyon Mountain Area as open to OHV's. This EA does not have the authority to change that status. Therefore, there would be no change and Alternative B would have all of the same direct effects as the No Action Alternative.

Vegetation and fuels manipulation in the 1000 foot buffer zone could have short-term effects on OHV users in the area. During operations, areas may be closed to OHV's for safety reasons. There is the potential for new trail development after vegetation and fuels manipulation. As vegetation is removed from the area, sight distance would be increased, resulting in a potential for new OHV routes. Since so little of the project area would be treated in this alternative, it is likely a catastrophic fire would still occur and the effects would be the same as Alternative A.

The effects of Alternative B likely would not be very noticeable in the short term (one year) because many of the effects would be gradual. However in five years or ten years the impacts would likely become very noticeable. It is likely that there would be a substantial amount of erosion, several miles of new routes and many more parallel routes all of which would be used by substantially more riders than are currently using the project area.

4.3.7 Mining and Minerals

Untreated and inadequately treated areas could, if drought conditions persist, act as a breeding ground for bark beetles that could spread to and kill healthy trees in both treated and untreated areas. As a result, timber resources available on claims for mining-related operations would remain at risk of being lost. Furthermore, the increasing fuel load of dead, dying, and down wood would continue to pose a wildland fire risk to mining equipment, structures, and production time. However, a stand-replacement fire could lead to additional economic mineral discoveries due to ground exposure from fire and suppression activities.

4.3.8 Range Management

See Section 4.2.8 – Range Management Effects – No Action Alternative.

4.3.9 Social and Economic

This alternative would not affect any of the current social concerns on the mountain. It's limited treatment small diameter trees on 225 acres of the mountain will not reduce the threat of catastrophic wildfire to the local communities and homes. If any merchantable value can be salvaged from the cut trees it would amount to approximately 12 thousand dollars in value at a local mill, which is likely not worth the effort to collect, deck, load, transport and process.

See affects to the No Action Alternative details.

4.3.10 Wildlife

This Alternative would change forest structure for wildlife species on 225 acres. Only trees 12 inches DBH and less would be cut, therefore the percentage of trees (by size class) that would remain in an average stand on the 225 acres would change as described in Table 4.6.

Table 4.6 – Tree sizes and percentage in project area.

Tree Size	dbh	Percent
Sapling/Pole	1-9"	0%
Small Tree	10-14"	55%
Medium Tree	15-19"	28%
Large Tree	20-29"	14%
Giant Tree	> 30"	3%

Table 4.7 – Forest Structure for Widlife.

Basal Area	Estimated % Canopy Closure	Structural Definition	Estimated Treatment Acres	Estimated Non-Treatment Acres	Percent of Total	% Change from Existing
10-60	10-39	Open	0	721	29	0
60-120	40-69	Moderate	225	805	42	+10
120+	70-100	Closed	0	731	29	-10

Canopy cover would be expected to be in the moderate and closed / multi-story structural categories.

The remaining acreage in the analysis area would remain untreated and have affects the same as described in the No Action Alternative.

4.3.11 Fish

Double PACFISH (USDA FS and USDI BLM 1995) buffers will be implemented for all Riparian Habitat Conservation Areas (RHCAs). These buffers would be as follows: 600 feet on either side of fish bearing stream, 300 feet on either side of perennial non-fish bearing streams, ponds, reservoirs and wetlands greater than 1 acre and 200 feet on either side of seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides and landslide prone areas. These buffers are in excess of what is adequate to protect fish bearing streams from non-channelized sediment inputs and to be sufficient to provide other riparian functions such as: litterfall and nutrient input/retention, shading, woody debris recruitment, and stream bank stability. (Stowell 1995)

Effects to fish and habitat would be similar between action alternatives because of PACFISH buffers. Although proposed treatments may differ, the anticipated ground disturbance is not expected to increase sediment that would reach the stream.

The direct effect to the fisheries resource from PACFISH buffers is the assurance no activities would occur that would directly harm fish or riparian habitat, water quality, and/or channel stability. Since no stand management will be allowed inside the buffer, important components such as large wood, shade and channel stability would virtually continue to be maintained at the present level in the short term. Long term, channel adjustments would continue to progress with the natural recruitment of large wood and flow regime. Riparian vegetation would change from a seral stage to a climax stage where conifers would shade out hardwood species and herbaceous vegetation. Overall, implementation of these buffers would be indistinguishable from the no action alternative.

The doubling of PACFISH buffers would not noticeably change fish habitat or riparian vegetation characteristics. No unstable landforms have been identified in the project area. Trees outside the buffer that may contribute to large wood recruitment typically do not exceed 150 feet in height therefore would not reach the stream. Although steeper slopes have potential to increase flow, velocity, and sediment transport, non-channelized sediment rarely travels more than 300 feet. (Stowell 1995)

Over time, natural recruitment of large wood and riparian vegetation would influence meeting riparian management objectives within site potential capability. These objectives are greater than 100 pools per mile, water temperature less than 64 degrees Fahrenheit, greater than 20 pieces of large wood per mile, greater than 80 percent bank stability, greater than 75 percent of banks with less than 90 degree angle (i.e., undercut), and width/depth ratio less than 10 (mean width divided by mean depth) (USDA FS and USDI BLM 1995). Existing disturbed conditions at varying locations along the stream such as channel entrenchment, bank rock content, floodplain width and channel substrate, influence the capability of the site to achieve natural potential. The site potential is likely limited from pre-European conditions by post 1862 activity as well as existing and future disturbances caused by mining and associated access requirements. These activities are governed by the General Mining Act of 1872 and are independent of any proposed action for this project.

Riparian roads provide access for unauthorized woodcutting that will reduce recruitment of large wood to the channel and damage to riparian vegetation. These roads and/or crossings are causing channelized flows that carry sediment, which increases turbidity, cobble embeddedness and reduces pool quality will not be closed.

4.3.12 Hydrology

The risk of catastrophic wildfire is not reduced by this alternative. Thinning would occur in the lower elevations of the project area in the Long Gulch, Rich Gulch and Quartz Gulch drainages that are already disturbed by roads and historic mining activity. Therefore, the majority of Little Canyon Mountain watersheds would still be susceptible to an active crown fire. Within Little Pine Creek's watershed, only a small portion of Quartz Gulch would be thinned to reduce the risks of wildfire. Therefore the effects of this alternative are only slightly spatially modified from the No Action Alternative.

4.3.13 Soils

Road, trail and ditch impacts are similar to Alternative A. High rates of erosion and impact from OHV's can be expected from this alternative. Slash burning impacts to soils will be very high in this alternative. Soil impacts with slash pile burning are similar to those under intense wild fires. Most of the treatment area for this alternative is in the dryer lower elevations zone that has a greatest susceptibility to weed infestations. Medusa head spread would be a concern under this alternative with the high slash pile burn disturbance. Ground based logging disturbance will be slight in this alternative (lowest of all the alternatives) as there will be no heavy equipment use. The treatment area for this alternative is the lowest of all the action alternatives other than the No-action. The average basal area post treatment for this area ranges from 20.1 to 140.1. This does not meet the recommended basal area post-treatment recommendations to reduce crown fire potential (40-60 BAF).

4.3.14 Cultural Resources

See Chapter 2 – Common to all action alternatives section. There will be no effect to cultural resources when these design features are followed.

4.4 Alternative C

4.4.1 Fuels

This alternative, like the No Action Alternative, would not target dead and dying beetle-infested trees for removal, unless they were removed as part of the thinning from below process. Over time, as these trees died, dead and down fuels would accumulate in the project area, leading to more intense fire behavior in the event that a fire started. This would be caused initially by the increase in surface fuels (needles, small branches), and subsequently by the increase in downed woody debris (branch and downed log). As fuels continued to accumulate, the site would create more hazardous conditions for suppression forces by increasing fire behavior and intensity. As a result, the

chance that fire behavior would exceed suppression activities would increase over time.

This alternative would treat over 2,000 acres in the proposed project area to two different basal area targets. In the lower slopes, toward Canyon City, basal area targets would be 30-50 BA. In the upper slopes, where pine and fir stands were historically established, the target basal area would be 60 –100 BA. In addition, some areas, containing large numbers of western juniper, would fall well below the low-end basal area targets. Curlleaf mountain mahogany would be targeted on the western slopes to reduce overall fuel accumulations. Mature, decadent mahogany shrubs would be cut and pile-burned to eliminate flammable material. While no specific Wildland Urban Interface Zone would be designated, the low-end basal area target of the historic perspective would effectively create a zone around Canyon City and nearby residences where the fuels would be managed for surface fire (flame lengths less than 4 feet.). Surface fire flame lengths are safely manageable by ground based suppression forces under most conditions.

The average basal area in the lower slopes would change from approximately 100.4 BA to 30 – 50 BA. In the higher elevations, the basal area would change from an average of 99.0 BA to 60-100 BA. In some cases, the target basal area would already be met, and little or no treatment would be required.

Predicted fire behavior in the treated stands would change from an average of 78 percent of the lower area initiating passive or crown fire under 97th percentile conditions to only 11 percent of the acres in the project area initiating crown fire under 97th percentile conditions. In the upper elevations (target basal area 60 – 100) predicted fire behavior in treated stands would change from an average of 55 percent initiating passive or active crown fire to only 22 percent of the acres in the project initiating crown fire under 97th percentile conditions. In addition, approximately 210 acres would be retained in a condition of 100-150 BA to maintain wildlife habitat. These stands, although susceptible themselves to crown fire, would be scattered throughout the project area and the project area would still be managed for surface fire.

Although a few areas remain at risk for crown fire, for the most part, any crown fire advancing on the urban area would be expected to drop to the surface and burn with intensities that are safely and effectively managed by ground based suppression forces.

4.4.2 Entomology

Alternative C would reduce the hazard from bark beetles by a substantial degree, and should provide a mosaic of stand conditions where bark beetle activity would be within endemic levels, consistent with a more natural setting than the one that exists today. Alternative C would leave about 210 acres at stocking densities above the UMZ and hence susceptible to bark beetles. From a landscape perspective, this is a small proportion of susceptible acres, and should not impair the attainment of the management objectives for the project area. Instead, having a small residual proportion of susceptible acres in Alternative C will provide a source of horizontal diversity in the LCM area where new snags will naturally occur and where foraging opportunities will be provided for woodpeckers.

In areas where a very aggressive treatment is proposed (with residual basal areas of 30-50 square feet per acre), there may be even less basal area remaining after treatment than expected due to tree mortality from insect infestation. If tree cover is important on those treated acres, it may be advisable to target the higher end of the proposed residual basal area ranges in order to compensate for some unexpected tree mortality.

Within five or ten years, the surviving residual trees should have sufficient resources to grow and be resistant to bark beetles as long as their basal areas remain below the threshold of 100 square feet per acre.

4.4.3 Silvicultural Resources

The dead and dying tree component currently under attack from beetles would not be removed, however, the decrease in stocking density will decrease tree stress over time and allow the existing trees to recover in health and vigor. As tree vigor and health increase so does resistance to insect infestations.

The current infested dead and dying trees occur in all size classes. Thinning from below would remove small-infected trees as well as small healthy trees while leaving the larger dead and dying trees. Thinning from below would avoid the opportunity to effectively control the insect epidemic. The larger trees would continue to die and there would be fewer smaller healthy trees to take their place.

The basal area of 30-50 would result in a spacing of approximately 42 feet, the 60-100 basal area would be approximately a 30 foot spacing, and the 100-150 basal area would equal approximately 20-27 foot spacing (Appendix F). However, spacing could be very erratic. Trees left in this spacing would include both insect infested (dead/dying) and live trees. As these dead trees fall to the ground and other live trees become infested and fall, long term spacing would be very erratic and could range up to 100 feet.

"While removing small trees is a necessary part of any effort to reduce hazard, this analysis clearly shows that it is not sufficient. In addition, removing late-successional species and reducing density sufficiently to induce seral species regeneration (and enhance sustainability) commonly requires cutting some medium-sized and larger trees with commercial value" (Fiedler et al. 2001). Therefore, a comprehensive stand treatment prescription "is clearly superior to prescriptions that focus only on removing small trees" (Fiedler et al. 2001).

Thinning dead/dying and healthy trees from below only would not address the current fire hazard situation (dead trees with brown and red needles). These trees are currently adding fuels to the ground by dropping needles and branches. Some of these trees have already fallen to the ground and many more will fall in the near future thus adding to the ground surface fuels. "Our evaluation of crown fire hazard following treatment shows that these small tree removal prescriptions do not achieve their stated objectives" (Fiedler et al. 2002). "Only three percent of the acres receiving a Thin-from-Below treatment would still have a low fire hazard rating 30 years later" (Fiedler et al. 2001).

Since insect infested and healthy trees would be thinned from below in this alternative the current insect infestation would continue to kill the larger healthy trees, especially in the areas with a target basal area of 100-150. This threat to remaining live trees would reduce as the target basal area of 30-50 is attained since wider spacing makes insect transportation to new hosts more difficult.

4.4.4 Visual Resources

This alternative proposes a substantial change in basal area and tree spacing when compared with existing conditions. Changes in form, line, color and texture would occur, however, most of the changes would repeat the form, line, color and texture found in the characteristic landscape.

The potential exists for treatment areas with markedly different thinning rates to appear as new forms in the landscape, outlined by visible lines. However, the expected contrast in form and line would be greatly reduced with careful grading or feathering a wide swath around the perimeter of each treatment area, and decreasing the cutting rate along the northeast-southwest ridgeline.

The 'non-traditional forest areas', with the higher thinning rate, are primarily located at lower elevations along the base of the LCM. Here actions are less visible, and would tend to blend in with the adjacent private lands where previous vegetative treatments have taken place. The shapes or forms introduced by the treatment areas would closely repeat the form of the burned area openings on the Canyon Mountain ridge in the background. The 'non-traditional' areas, while thinned at the higher of the two rates, would not likely appear out of place on LCM. The 'non-traditional' treatment area that occurs along the northeast ridgeline would be thinned at a reduced rate so as not to attract attention (see the prescription for ridgelines and skylines under actions common to all alternatives).

Following treatment, the 'non-traditional' treatment areas would appear as predominately light green, gold, or white (during winter), dotted with dark green trees, interspersed with heavily forested "traditional' areas. While this would be a change in color and texture, the changes would repeat the color and texture provided in the characteristic landscape on Canyon Mountain ridge, behind LCM.

Changes in form, line, color and texture would be expected in Alternative C however, the changes would repeat those found in the characteristic landscape, along Canyon Mountain ridge. With reduced thinning along the ridgeline, the degree of visual contrast expected between the alternative and the characteristic landscape would be weak in the elements of form, line, color and texture. Alternative C would meet Class II VRM objectives in all four elements.

4.4.5 Road Engineering and Transportation

This alternative will have the same detrimental effects on the road system as described under Alternative A.

4.4.6 Recreation and OHV Use

Alternative C would create a 100-250 foot buffer around the pit. The intent of this thinning is to reduce the fire hazard but to also limit the sight distance for OHV's that are recreating in the pit. This would help prevent creation of new routes out of the pit area. Additionally, this buffer could act as a sound and dust barrier to nearby landowners. The buffer would have no impact on the OHV users in the pit.

Under this alternative, it is likely that garbage dumping would continue. All activities that currently exist in the pit would likely remain the same under Alternative C.

The vegetation treatment proposed in Alternative C has the potential to promote the proliferation of all classes of OHV use across the treatment area. Ground based logging systems that do not fully suspend logs leave skid trails that are excellent for OHV travel, and create the potential for more established OHV routes in the years following the vegetation treatments.

The target basal area for Alternative C, outside of the traditional forest areas, is extremely open to reduce fire danger. This open stand structure would increase sight distance for OHV users and likely increase hill climbing opportunities and other cross-country OHV use in the firebreak with lesser use in the traditional forest area. It is likely with the open forest structure that routes on Little Canyon Mountain would be very visible from Canyon City and the surrounding lowlands.

In the first year or two after the actions are performed, there would be little noticeable impact. In that time period, OHV users would be exploring the new skid trails. About five years after the actions, there would be a noticeable increase in tracks on new skid trails. OHV users would become familiar with various routes by then and bring along more users. In ten years, the projected increase in overall numbers of OHV users would be noticeable. More use on existing trails would be evident and there would be more trails being created.

4.4.7 Mining and Minerals

Restoration of the LCM forest to its "historic condition" has implications for miners and mining operations. The large-scale removal of trees from slopes and ridge tops would substantially limit the available timber for mining-related use on a number of existing and future claims. However, the reduction in fuel load would substantially reduce the wildland fire hazard to miners, mining related equipment, and production time. Moreover, the ground exposure in the extensively thinned areas could lead to new mineral discoveries.

The effects of this alternative would occur during and after timber removal from "historical" grassland/steppe areas and continue as long as the "historic condition" is maintained.

4.4.8 Range Management

There are no effects to this resource from this alternative.

4.4.9 Social and Economic

This alternative would result in a tremendous decrease in catastrophic fire risk to the mountain and adjacent urban areas. Forest stands on the mountain would appear more open than their previous condition. Open patches would mimic pre-fire suppression conditions. This pattern would not provide a complete fuel break between the mountain and local residences. The areas with higher basal area at the public/private boundary would however, be surrounded by low, more reduced risk stands.

The amount of trees cut in this alternative would provide the potential to recover value from these bi-products of fuels thinning. The trees cut in this alternative would be worth an estimated 457 thousand dollars prior to processing.

4.4.10 Wildlife

This Alternative would change forest structure for wildlife species as described in Table 4.8.

Table 4.8 – Forest Structure for Wildlife.

Basal Area	Estimated % Canopy Closure	Structural Definition	Estimated Treatment Acres	Estimated Non-Treatment Acres	Percent of Total	% Change from Existing
10-60	10-39	Open	1202	113	53	+24
60-120	40-69	Moderate	777	113	36	+4
120+	70-100	Closed	105	178	11	-26

A reduction in curl-leaf mountain mahogany and western juniper would occur under this alternative. The targeting of western juniper and thinning of mahogany stands would displace some of those species that utilize these habitat types to others areas on private or National Forest land that have these habitats available. The thinning of the mahogany stands should result in increased establishment of mahogany seedlings, which, in turn should make more browse available for big game that utilize the area.

This Alternative would provide marginal cover for big game on approximately 890 acres (canopy closure of 40-69 percent) of treatment area and optimal canopy cover on approximately 283 acres (canopy closure greater than 70 percent). Treatment of areas adjacent to existing roads and trails reduces habitat security and increases the potential for disturbance and poaching of big game.

4.4.11 Fish

As mentioned in the existing condition, mining activity after June 8, 1862 had severely degraded the streams. No pre-1862 data is present to indicate the condition of the riparian and stream area, or the fish populations and their distribution.

PACFISH buffers will be implemented for all Riparian Habitat Conservation Areas (RHCAs). These buffers are as follows: 300 feet on either side of fish bearing stream, 150 feet on either side of perennial non-fish bearing streams, ponds, reservoirs and wetlands greater than 1 acre and 100 feet on either side of seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides and landslide prone areas. (USDA FS and USDI BLM 1995). These buffers are considered to be adequate to protect fish bearing stream from non-channelized sediment inputs and to be sufficient to provide other riparian functions such as: litterfall and nutrient input/ retention, shading, woody debris recruitment, and stream bank stability. (Stowell 1995)

Road maintenance would be limited to shaping the road surface to better facilitate vehicle traffic and reduce channelized flows on the road surface. Cutoff roads would continue to contribute sediment and flow to the drainage ditches on the main road.

The direct effect to the fisheries resource from PACFISH buffers is the assurance that no activities would occur that would directly harm fish or riparian habitat, water quality, and/or channel stability. Since no stand management will be allowed inside the buffer, important components such as large wood, shade and channel stability would virtually continue to be maintained at the present level in the short term. Long term, channel adjustments would continue to progress with the natural recruitment of large wood, riparian vegetation changes and flow regime. Overall, implementation of these buffers would be indistinguishable from the no action alternative.

The indirect effects of implementing PACFISH buffers is that, over time, natural recruitment of large wood and riparian vegetation would lead to channel stability, eventually reaching the natural site potential and riparian management objectives.

This site potential likely is limited by historic activity as well as existing and future disturbances caused by mining and associated access requirements. These activities are governed by the General Mining Act of 1872 and are independent of any proposed action for this project.

Likewise, no improvements to roads that are currently contributing sediment to the stream would result. The existing road crossings that may be producing adverse effects would not be closed or improved.

4.4.12 Hydrology

This alternative will result in the lengthening of time required for the snowpack to melt by increasing the percent of the project area that falls into the minimum solar radiation input cover by a quarter. In addition, this alternative will result in maximum sublimation because of the very large openings created. (Troendle 1984) These openings are similar to those created by a more natural wildfire regime. Although this loss can result in slightly decreased runoff and streamflow, the number of openings in this alternative is not expected to have a measurable impact on streamflow.

Peak flows may slightly increase under this alternative. Using Harris and Hubbard's regional equations, bi-annual peak flows are predicted to increase 2-3 percent. The hundred-year flood would increase 2-8 percent. (see Appendix Q)

The targeting of juniper for removal from the western and northern portions of the project area will improve infiltration, decrease erosion, increase water yield, and increase interception (Buckhouse 1999). An increase in springs and wet meadows as a result of targeting juniper trees for removal may be expected on the northern portion of the project area (McCarthy III, 1999). The confined aquifer in the alluvial toe slopes of Little Canyon Mountain may exhibit increases in water yield. However, it would be difficult for juniper tap roots to reach the deep water table indicated by the well logs so the quantity of effect is unknown.

The majority of juniper occurs on the western portion of Little Canyon Mountain. Removal of the juniper on the western portion of the project area will make more water available for herbaceous species, effectively changing the watershed cover and characteristic response of the watershed to precipitation. (see Appendix Q)

On the harvested portions of the watershed, increases in herbaceous species will be expanded within 5 years. Bunchgrasses and forbs have the potential to be more widespread than before the juniper was targeted. A large portion of precipitation previously intercepted by the juniper and funneled down its trunk to its roots would be intercepted by the grass and infiltrated.

Within 10 years small juniper may be re-establishing on the watershed, but their affect on watershed cover would be minimal due to their small stature.

4.4.13 Soils

Alternative C tries to emulate the conditions that existed back in the late 1800's. These conditions were thought to have developed through less intense, more frequent, fire burn intervals. The historic pictures show a more open tree stand on the upper slopes that was probably comprised of a mix of ponderosa pine and Douglas-fir. On the lower slopes there were scattered ponderosa pine and Douglas-fir with a high shrub cover. Juniper was present but in minor amounts. This alternative has the highest treatment area for ground based logging and thus the highest potential for soil surface impacts (soil compaction). Juniper and decadent mountain mahogany would be targeted under this alternative. This will increase the shrub and grass amounts in areas with high degree of encroaching juniper and improve water infiltration and reduce surface erosion. The slash treatment came out to 6.3 trees per acre but would be increased with the extra mahogany. Hand pile burn impacts would be moderately high and would be similar to Alternatives D and F. Burn impacts (bare soil surfaces) at elevations below 4,300 feet could have a greater potential for weed and medusa head invasion. Improvements to roads, trails and old ditches are not planned for this alternative so these conditions would be similar to the no action (high for erosion and sedimentation). The elimination of slash and down wood from hand pile burns and the subsequent prescribed burn entries within the natural fire interval cycle of 7 to 25

years could open up the area and promote increased OHV traffic over areas presently not used by OHV's.

4.4.14 Cultural Resources

There are no effects to this resource.

4.5 Alternative D

4.5.1 Fuels

This alternative would treat over 2,000 acres in the proposed project area to a single, uniform basal area target of 40 – 60 BA. While no specific Wildland Urban Interface Zone would be designated, this low-end basal area target would effectively create a zone around Canyon City and nearby residences, and throughout the entire project area where the fuels would be managed for surface fire (flame lengths less than 4 feet.).

This alternative, like the No Action Alternative, would not target dead and dying beetle-infested trees for removal, unless they were removed as part of the thinning from below process. Over time, as these trees died, dead and down fuels would accumulate in the project area, leading to more intense fire behavior in the event that a fire started. This would be caused initially by the increase in surface fuels (needles, small branches), and subsequently by the increase in downed woody debris (branches and downed logs). As fuels continued to accumulate, the site would create more hazardous conditions for suppression forces by increasing fire behavior and intensity. As a result, the chance that fire behavior would exceed suppression activities would increase over time.

The average basal area would change from approximately 98.8 BA to 40 – 60 BA. Predicted fire behavior in the treated stands would change from an average of 89 percent of the project area initiating passive or crown fire under 97th percentile conditions to only 11 percent of the acres in the project area promoting conditional (transitioning from surface to passive crown fire) under 97th percentile conditions.

Although very few areas would remain at risk for individual torching/passive crown fire, for the most part, any fire would be expected to remain on the surface and burn with intensities that are safely and effectively managed by ground based suppression forces.

4.5.2 Entomology

Alternative D would reduce the hazard from bark beetles by a substantial degree, and should provide a mosaic of stand conditions where bark beetle activity would be within be endemic levels, consistent with a more natural setting than the one that exists today. Alternative D would provide less habitat for bark beetles and their predators than the other alternatives.

Within five or ten years, the surviving residual trees should have sufficient resources to grow and be resistant to bark beetles as long as their basal areas remain below the threshold of 100 square feet per acre.

4.5.3 Silvicultural Resources

Thinning the entire area from below to a target basal area of 40-60 feet would result in a spacing of approximately 38 feet, which would include both live and insect infested (dead/dying) trees. This treatment would not address the insect epidemic, as it currently exists. The current insect dead and dying trees are trees of all size classes. The dead and dying tree component currently under attack from beetles would not be removed, however, the decrease in stocking density will decrease tree stress over time and allow the existing trees to recover in health and vigor. As tree vigor and health increase so does resistance to insect infestations. During this recovery time the larger trees would continue to die and there would be fewer smaller healthy trees to take their place. Trees left in this spacing would include both insect infested (dead/dying) and live trees. As these dead trees fall to the ground and other live trees become infected and fall, long term spacing would be very erratic and could range up to 100 feet.

Since insect infested and healthy trees would be thinned from below, the current insect infestation would continue to kill some of the larger healthy trees. The threat to these remaining live trees would be reduced since the 40-60 target basal area would result in an approximate 38-foot spacing. This spacing makes insect transportation to new hosts more difficult. Since infected tree would be included in this 38-foot spacing, the spacing would widen as these infected trees fall to the ground.

4.5.4 Visual Resources

Implementation of this alternative would likely attract the attention of the common observer, especially on slopes over 35 percent where changes in tree spacing would stand out compared with existing conditions. The proposed cutting rate would not likely attract attention in flat or gently sloping terrain, but the same cutting rate would become increasingly noticeable where the slope increases. In flat terrain, the viewer sees many "layers" of trees at the same time, which blend together to form a forest. As slope increases, the viewer sees fewer and fewer "layers" of trees, until only one "layer" of trees may be visible against the hillside, causing light green, gold, or white spaces to appear between trees.

Uniform thinning over the entire mountain would maintain the solid triangular form of the existing vegetation. There would be no large openings or variations in thinning rates to attract the attention of the observer. Although new lines would be introduced at BLM/private property boundaries due to an abrupt change in tree density, these lines would be primarily located at the base of the mountain and most are obscured by low hills. The continuity of the strong existing northeast-southwest ridgeline would be maintained by incorporating reduced thinning rates along the ridgeline, resulting in a weak contrast in the element of line.

In this alternative, the strongest degree of contrast would result from the change in vegetative color and texture. On slopes over 35 percent, the solid dark green color of the existing forest would appear as predominately light green, gold, or white (during winter), dotted with dark green trees, creating in a moderate degree of contrast in vegetative color. The continuous texture of the LCM forest canopy would appear much more coarse on steeper slopes, resulting in a moderate contrast in texture. Although Canyon Mountain ridge, behind LCM, provides variety in color and texture in the characteristic landscape, the variety would not be repeated in this alternative. Instead, a uniform cutting rate would appear unnatural and thus attract attention.

Uniform thinning of all public lands on LCM at the proposed rate would result in a weak degree of contrast in the element of form and line and a moderate degree of contrast in the elements of color and texture, when compared with the characteristic landscape of LCM. This alternative would meet Class II VRM objectives for form and line, but would not meet Class II VRM objectives for color and texture.

4.5.5 Road Engineering and Transportation

Under this alternative the following effects will occur in regards to the existing road system. The last 400' of the BST section of the road is adjacent to a private residence will be improved by straightening out a curve at this location that will move the road approximately 40' further from the house. This section of road would cross a small draw and a culvert will need to be installed.

Before any management activities occur, the native surfaced portion of the road will need to be scarified, bladed and shaped to remove the existing ruts and mud holes. At the same time, additional drainage dips will need to be constructed to divert water off the road into areas where any sediment will have little opportunity to reach streams. Approximately eight additional drainage dips per mile will be needed. There may be areas where it would be desirable to excavate unsuitable material from the roadbed and backfill with select borrow material before placing the surface course. After blading and shaping an eight to ten inch lift of pit-run or grid-rolled rock needs to be placed from MP 0.3 to MP 3.17. This would require approximately 5, 000 cubic yards of material.

Under this alternative, the section of road from MP 0.7 to MP 1.24 will be relocated away from Little Pine Creek (See Maps 2.3 and 2.4). This route would be approximately 0.5 miles long. From its junction with the existing road, the new route would cross the upper end of a small basin and then follow a draw for approximately 500 feet. The road would then cross a ridge with a through-cut. Geotextile would need to be placed on the subsurface from where the road crosses the basin to where it crosses the ridge. After crossing three small dry draws the road would continue climbing up a ridge. It would connect with the existing road at MP 1.24 and would include two switchbacks and four 18 to 24 inch culverts. The first switchback is near an old log structure that has collapsed. If possible this structure needs to be protected. In the middle of the second switchback the road crosses a ditch formerly used to provide water to mining claims. A culvert will be needed at this location to allow water to continue flowing in this ditch. This route would need to have the same lift of rock placed on it as is on the rest of the road.

The roads that access active mining claims will need to remain open. Some of the other roads will also need to remain open but many roads may be closed (See Maps 2.3 and 2.4). All roads that are closed would need to be bladed and shaped to remove ruts, have drainage dips and/or waterbars constructed, and seed and mulch applied at a rate 1.5 to 2 times the normal rate. The closures may be implemented by constructing "tank traps" and/or by spreading slash over the first one hundred to two hundred feet of the road.

4.5.6 Recreation and OHV Use

Alternative D would create a 100-250 foot buffer around the pit. The intent of this is limit the sight distance for OHV's that are recreating in the pit. This would help prevent creation of new routes out of the pit area. Additionally, this buffer could act as a sound and dust barrier to nearby landowners. The buffer would have no impact on the OHV users in the pit.

Alternative D would also close the pit to full size vehicles at both the north entrance and the southeast entrance (see appendix I); closing off the pit to trash dumping. This would impact different classes of OHV's in different ways. For Class I/III OHV's, it would improve the site by reducing the health and human safety hazards presented by having garbage in the pit. It would not reduce the riding opportunities for Class I/III OHV's.

By placing the barriers 50 inches apart, Class II OHV's would be excluded from gaining entrance to the pit at either the north or southeast entrances. This would likely decrease the use by Class II OHV's in the pit. However, it would not completely eliminate Class II OHV's because there are other, more technically challenging, ways to gain entrance to the pit. It is likely that committed Class II OHV users would find other ways to access the pit, for others that are less committed, it is possible that the barriers would be enough to deter them from mud-bogging in the area altogether.

The vegetation treatment proposed in Alternative D has the potential to promote the proliferation of all classes of OHV use across the treatment area. Ground based logging systems that do not fully suspend the logs leave skid trails that are excellent for OHV travel and create the potential for more established OHV routes in the years following the vegetation treatments.

With the open forest structure, sight distance would be improved and OHV users could potentially see hill climbing opportunities from the pit, and search those out. New routes would likely proliferate.

In the first year or two after the actions are performed, there would be little noticeable impact. In that time period, OHV users would be exploring the new skid trails and discovering new ways to gain entry into the pit. About five years after the actions, there would be a noticeable increase in tracks on new skid trails and substantially more use on alternative routes into the pit. OHV users would become familiar with various routes by then and bring along more users. In ten years, the projected increase in overall numbers of OHV users would be noticeable. More use on existing trails would be evident and there would be more trails being created.

4.5.7 Mining and Minerals

Most actions of this alternative would probably have minimal impact on miners and mining operations. Removal of infested trees from the area should mitigate the potential loss of timber from bark beetles while leaving sufficient timber resources for mining-related purposes. In addition, thinning of the area should substantially reduce the wildland fire threat to miners, mining-related structures and equipment, and production time. However, re-routing the main access road would reduce road access to parts of two active mining claims.

4.5.8 Range Management

With installation of the proposed fence the portion of Little Pine Creek administered by the BLM will be excluded from livestock use.

4.5.9 Social and Economic

This alternative would treat the entire mountain to a very low stand density. Post treatment stand conditions would be substantially more open across the entire mountain. This alternative would decrease the risk of catastrophic fire across the entire LCM area. The fuel break would be approximately 1.5 miles from the local urban areas.

The amount of trees cut in this alternative would provide the potential to recover value from these bi-products of fuels thinning. The trees cut in this alternative would be worth an estimated 347 thousand dollars prior to processing.

There would be substantial road work done in this alternative. The main access road would be upgraded along its entire length. It would be re-routed away from Little Pine Creek for a length of 0.15 miles. Several miles of existing roads would be closed as well.

There are several options for obtaining rock for road improvement work:

1) Obtain rock from the Holliday Pit on US Highway 26 at approximately MP 169. This should lower the unit cost due to decreased haul distance but the cost of the rock is unknown. There would probably be a royalty fee charged plus the cost of producing the desired material. This may not be possible due to the fact that this is mostly river bottom type rock that would not have the angularity that is needed to hold the surfacing together.

2) Obtain a permit from the Malheur National Forest to remove rock from either the Star Ridge Pit, which is near MP 17 on US Highway 395 south of John Day, or the Four Corners pit which is near the intersection of County Road 18 and Forest Road 36 northeast of John Day. The use of either of these pits would increase the haul cost because they are further from the project than the Tidewater Pit. The removal of material from either of these pits would require an agreement between the BLM and the Malheur National Forest.

3) There is a private pit on County Road 54. The owner of this pit could be contacted and arrangements made for use of that material. The haul from this pit would be almost as far as from the Tidewater Pit.

4) Use material from the Iron King Mine which is located on Forest Service land in Section 18. This will require an agreement with the owner of the mine. It is not known at this time whether the owner would charge a royalty for this material or not so that cost is not included.

Total cost of road work in Alternative D = $183,514 or $65,076/mile.

4.5.10 Wildlife

This Alternative would change forest structure for wildlife species as described in Table 4.9.

Table 4.9 – Forest Structure for wildlife.

Basal Area	Estimated % Canopy Closure	Structural Definition	Estimated Treatment Acres	Estimated Non-Treatment Acres	Percent of Total	% Change from Existing
10-60	10-39	Open	2091	113	88	+59
60-120	40-69	Moderate	0	113	5	-27
120+	70-100	Closed	0	178	7	-32

Ten acres of conifer overstory removal would occur in riparian areas. While this would reduce the conifer component in the riparian area, this alternative would release some of the suppressed hardwoods potentially increasing the riparian habitat component.

Although additional road construction would increase road densities in the upland habitat component, the decreased road density in the riparian area would increase habitat security. This would benefit those species that utilize riparian areas.

Construction of 1 mile of new fence would increase the potential to disrupt normal movement patterns for big game, which, under extreme situations, may result in death from collisions, entanglement, or entrapment (Kindschy 1996). Proper fence design and use of appropriate construction materials can reduce the adverse effects of fences. Fence construction would reduce the grazing impacts currently observed in the riparian area and benefit those species that utilize riparian areas.

This Alternative would provide marginal cover for big game on approximately 113 acres (canopy closure of 40-69 percent) of treatment area and optimal canopy cover on approximately 178 acres (canopy closure greater than 70 percent). Treatment of areas adjacent to existing roads and trails reduces habitat security and increases the potential for disturbance and poaching of big game.

4.5.11 Fish

Road management will consist of reconstructing a segment of the main road to relocate it outside the 300 feet PACFISH buffer, surfacing the road with pit-run aggregate, and closing the existing segment along Little Pine Creek. The relocated segment is approximately 2,748 feet in length. Although approximately 600 feet of this realignment will still be within the PACFISH buffer, because of topographic design limits, it will be greater than 250 feet from the stream. The surfacing would be designed to preclude access to and from the main road by cutoff roads.

Direction in PACFISH for Road Management is: (RF-2b) to minimize roads and (RF-3b) landings in RHCAs, (RF-3a) reconstruct road and drainage features that do not meet design criteria or operating and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives (RMOs), and (RF-3b) to prioritize reconstruction based on the current and potential damage to listed fish or their designated critical habitat, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of the RHCA (USDA FS and USDI BLM 1995).

With these guidelines in mind, the best way to minimize sediment to Little Pine Creek is to relocate the segment of road, surfacing with aggregate, install adequate drainage structures, close the main road segment within the RHCA, and design reconstruction that will reduce potential for cutoff roads.

Four small (less than 2 acre) areas will have some conifers felled within the riparian area. The down trees will provide large wood to the channel and open the riparian canopy to allow hardwood vegetation expression that has been suppressed from over-shading. Trees will not be removed and may be bucked to ensure contact with bank full flows. Each area will have scattered conifer overstory to ensure future recruitment of large wood. The number of trees felled at any location will not cause a jackpot of fuels that could be detrimental to fish or habitat if a fire would occur.

A culvert on a private road easement is currently restricting upstream movement of juvenile salmonids because of outlet height. Two options to correct this situation are available. One is to lower the existing culvert and meet passage criteria for all life stages. The second option is to design a meander cascade to bring the channel up to the culvert outlet. In order to accomplish this, 8 inch minus pit run aggregate would be hauled to the site and placed in the existing floodplain in such a manner as to create a meander channel similar to that found above the culvert. The rough cobble channel would allow juvenile upstream migrations to reach the culvert outlet at a near level approach. Currently, there is no summer connectivity approximately 100 feet above the culvert for about 300 feet where low flows go subsurface.

One mile of fence would be constructed on the east side of Little Pine Creek to replace an existing allotment boundary fence. The fence would exclude livestock in the Pointer Allotment from the stream on BLM lands.

Road surfacing and installation of drainage structures would greatly reduce fine sediments to Little Pine Creek. Designing the reconstruction to reduce potential for cutoff roads will minimize flow and sediment delivery to the main road drainage system. All of these will improve the likelihood of attainment of RMOs and adverse effects to listed fish and habitat.

Alleviating the passage barrier at the culvert would allow all fish life stages access to upstream habitat during periods when seasonal volumes are sufficient to provide above ground flows to the segment that is subsurface during the summer. This may allow sub-adult fish that winter rear in the mainstem John Day River to return to the spawning/rearing areas of Little Pine Creek in early spring.

Construction of the fence would require removal of vegetation six feet on either side of the fence to allow livestock passage and sufficient space for fence maintenance. Any dead trees that could fall and damage the fence will be felled prior to construction. Livestock would not be excluded from the stream on private lands.

Over time, natural recruitment of large wood and riparian vegetation would lead to channel stability, eventually reaching the natural site potential and riparian management objectives.

This site potential likely is limited by historic activity as well as existing and future disturbances caused by mining and associated access requirements. These activities are governed by the General Mining Act of 1872 and are independent of any proposed action for this project.

By reducing sediment sources, cobble embeddedness would be reduced and channels remain stable. This would, in the short and long term, improve aquatic habitat and allow existing fish populations to reach the carrying capacity of the stream.

The construction of a fence on the east side of Little Pine creek would assure livestock would not have access to the stream on BLM administered lands. This exclusion would protect fish habitat by ensuring no bank damage from livestock would occur, redd trampling would not occur, increased sediment from bank sloughing would not occur, and riparian vegetation would not be impacted from grazing. Livestock on private lands would not be excluded from the stream by this fence construction.

4.5.12 Hydrology

Peak flows may slightly increase under this alternative. Using Harris and Hubbard's regional equations, bi-annual peak flows are predicted to increase 6-11 percent. The hundred-year flood would increase 5-18 percent. (see Appendix Q) This alternative would result in the lengthening of time required for the snowpack to melt because it increases the percent of the project area that falls into the minimum solar radiation input cover by a quarter.

The installation of a 1 mile fence to restrict cows from utilizing the riparian vegetation along Little Pine Creek would ensure that the provisions for riparian recovery outlined in this plan would be effective. In addition, riparian recovery that has already occurred

in the meandering sections of Little Pine Creek would continue (increased riparian vegetation, decreased with to depth ratio, and decreased fines).

Removing large trees from the base of transpiring plants in the riparian areas would increase annual water yield until other riparian woody species vegetate the open spaces. The removal of fir would have the most dramatic effect – transferring up to 6 inches of precipitation from evapotranspiration to stream flow. (Ffolliott, 1977) This increase over 10 acres does not appreciably affect annual water yield. The riparian treatment would also allow more energy to reach the stream channel in the form of sunlight. In this highly shaded stream, increased sunlight would increase the biotic community of algae, macroinvertebrates, and biotic life in general.

Treatment within this 10 acres of riparian areas would also promote a more rapid growth rate in the remaining conifers. These trees would serve as sources for large wood in the future. As episodic events occur in the channel, these large trees would eventually be recruited to provide diverse channel geometry, backwater, and pools.

After 5 years, the riparian treatments in the RHCAs would be revegetating with riparian vegetation. A study in the Oregon Coast rang found that stream temperature increases due to removal of riparian vegetation returned to pre-treatment levels in 5 years. (Fitzgerald, 2002) Woody riparian species would have begun to express themselves in the opening created in the RHCAs. Several seasonal cycles of flooding would have occurred to anchor and refine the placement of large woody debris in the stream channel. The large wood would deflect flood flows and sediments would have been deposited onto the floodplain.

Table 4.10 – Roads miles proposed for treatment.

Proposed Treatment	Feet	Miles
Decommission	27423	5.2
No Treatment	125914	23.8
Rock & Erosion-Proof	9611	1.8
Total	162948	30.9

The effects of forest roads were outlined in “Existing Environment” and “No Action Alternative.” Sections. Decommissioning these 5.2 miles of roads will eliminate 20 stream channel crossings and reduce sedimentation from roads by 280 tons per year (based on WEPP modeling). This will decrease the percent fines in Little Pine Creek by approximately 25 percent.The main road is currently in very bad condition in many areas, due to inadequate drainage and rutting due to high traffic levels. Rocking and Erosion-Proofing the main road will reduce sedimentation.

While re-routing ½ a mile of road will disturb approximately 1½ acres, 5 acres of currently roaded areas will be revegetated. Furthermore, the rerouted road will fix an erosion problem at an intersection of a road and a historic ditch. This site is currently eroding a gully out of a road that runs straight up the hillside. A switchback would be

constructed at this site and drainage dips and ditches would decrease the erosive energy of the water by diverting it away from the road towards the vegetated hillslope before it gathers momentum.

After five years, some revegetation of the decommissioned roads will have occurred. However, roads disrupt hill slope processes, and it takes many years for the subsurface flow regimes to reconnect across the disturbed areas. On the other hand, effects from harvest activities would have rapidly decreased, even stabilized. This is due to the expansion of herbaceous and shrub species into the open areas created by thinning. The remaining tree canopy would also begin to expand and intercept more moisture.

The long term reduction of fines to Little Pine Creek will reduce the amount of fines that fill in pools and create embedded riffles. These effects will begin to decrease as flood flows flush fine sediments out of the watershed.

4.5.13 Soils

The intense burn probability is low for this alternative. This alternative addresses road impacts to the main traffic route on the mountain and realigns the part of the road within the riparian buffer. The main haul road will be surfaced and rocked with coarse rock fragments. Road closures would also be proposed for this alternative to eliminate vehicle traffic crossing through riparian areas and eliminate erosion from cutoff spur roads intersecting the main haul road. Hand pile impact concerns are similar to the historic and graded alternatives. Juniper and mahogany are not targeted for this alternative so the potential for increased juniper invasion exists. The same concern exists in this alternative for increased OHV traffic with the elimination of slash and downed wood. The area of ground based logging is slightly less for this alternative compared to the historic and graded alternatives.

4.5.14 Cultural Resources

There are no effects to this resource.

4.6 Alternative E

4.6.1 Fuels

Beetle-infected ponderosa pine trees would be targeted initially to reach basal area reductions. This would ensure reduced amounts of fuel accumulations over time and offer more long-term protection from stand-replacing wildfire. Curlleaf mountain mahogany would be targeted on the top of the mountain to promote regeneration and seedling survival. Mature, decadent mahogany shrubs would be pruned and the branches scattered to protect seedlings from early over-browsing. While no specific Wildland Urban Interface Zone would be designated, the low-end basal area target of Level 1 would create a zone around Canyon City and nearby residences where the fuels would be managed for surface fire (flame lengths less than 4 feet.). Surface fire flame lengths are safely manageable by ground based suppression forces under most conditions.

The average basal area in Level 1 would change from approximately 138.1 BA to 40 – 50 BA. In Level 2 the average basal area would change from 168.8 BA to 50 – 70 BA. In Level 3, treatment would change the average basal are from approximately 159.5 BA to 70 – 90 BA. In Level 4, the basal area would change from an average of 119.1 BA to 90-100 BA. In some cases, the target basal area would already be met, and little or no treatment would be required.

Predicted fire behavior in the treated stands would change from an average of 34 percent of the Level 1 area initiating passive or crown fire under 97th percentile conditions to 100 percent of the acres in the Level 1 area maintaining a surface fire under 97th percentile conditions. In Level 2, predicted fire behavior in treated stands would change from an average of 100 percent initiating active crown fire to only 34 percent of the acres in the project initiating crown fire under 97th percentile conditions. In Level 3, predicted fire behavior would decrease from an average of 67 percent initiating passive or active crown fire to 100 percent of the acres in the Level 3 area maintaining surface fire under 97th percentile conditions. In the Level 4, predicted fire behavior in treated stands would not change and would retain an average of 100 percent initiating passive or active crown fire.

Several areas, particularly in the higher elevations remain at risk for passive or active crown fire. Higher basal area targets would not reduce dense stands to the extent necessary to reduce fire intensity. While most of the project area would be managed for surface fire, the top of the mountain remains at risk for stand replacing conditions, and the potential, under extreme weather conditions, remains for a crown fire, to burn with an intensity to great to be safely and effectively managed by ground based suppression forces. In turn, higher intensities increase the risk to Canyon City and nearby residences.

4.6.2 Entomology

Alternative E would reduce the hazard to bark beetles by a substantial degree, and should provide a mosaic of stand conditions where bark beetle activity would be within be endemic levels, consistent with a more natural setting than the one that exists today. Alternative E would provide less habitat for bark beetles and their predators that the other alternatives except Alternative D.

Within five or ten years, the surviving residual trees should have sufficient resources to grow and be resistant to bark beetles as long as their basal areas remain below the threshold of 100 square feet per acre.

4.6.3 Silvicultural Resources

Targeting the dead and dying insect infested trees then thinning from below would be a major first step in gaining control of the current insect epidemic. Thinning these acres would not only remove most of the dead and dying trees but thinning from below would also discourage infestation of the remaining healthy trees that exist on the site since trees would be widely spaced. “Thinning is often necessary to prevent stagnation or excessive mortality due to suppression and to create vigorous trees and stands in the absence of insects and disease” (Cochran et al. 1994). The trees in this stand are currently stagnant, growth

rates at 20-50 growth rings per inch and visual inspection shows mortality is excessive.

By reducing Level 1 to a 40-50 basal area, remaining tree spacing would be approximately 38 feet. Level 2 50-70 basal area would result in approximately a 34 foot spacing. Level 3 70-90 basal area would equal approximately a 29 foot spacing and Level 4 basal area of 90-100 would equal approximately a 27 foot spacing. (See Appendix F for a correlation between basal area and tree spacing.)

Frequency of stand treatment re-entry would correspond directly with the intensity of thinning. Thinning to a higher basal area of 90-100 would require a more frequent re-entry than thinning to a lower basal area of 40-50, since the stand would return to the excessive basal area of 100+ sooner. "Basal areas around pine trees should be kept under 100 square feet per acre on poor sites" (Appendix F). Therefore, a re-entry in Level 4 would be necessary within approximately 5-10 years while a re-entry in Level 1 would delay re-entry to approximately 25-35 years.

Removing the dead and dying trees would gain a varying degree of control of the fire hazard situation that currently exists within the project area. Removing these current and future hazard fuels would reduce the potential for fire intensity in the short term. This comprehensive treatment of removing infected trees and thinning from below would reduce the potential for fire intensity and crown fires in the long term. Level 1 ponderosa pine stands would be the most likely portion of the project area to withstand a crown fire while the Level 4 Douglas fir stands would be the least likely portion of the project area to withstand a crown fire. "73 percent of acres treated with the Comprehensive prescription would still have a low fire hazard rating 30 years later" (Fiedler et al. 2001).

4.6.4 Visual Resources

Implementation of this alternative would maintain the solid triangular form of the existing vegetation, assuming the incorporation of visual screening and dead-tree retention in treatments of insect-infested areas. Variations in thinning rates would be gradual and unlikely to attract the attention of the common observer. Although new lines may be visible at BLM/private property boundaries do due to an abrupt change in tree density, these boundaries are primarily located at the base of the mountain and some areas are obscured by low hills. Thinning at the upper elevation ridgelines and skylines would be at the lowest of the four rates, providing more tree cover in these visually sensitive areas. Spaces between trees would appear light green, gold, or white (during winter), but would repeat the color contrast visible in the Canyon Mountain ridge. The solid texture of the existing forest would appear more coarse but again would repeat the variety of textures visible in Canyon Mountain ridge.

Graded thinning over the entire mountain would result in a weak degree of contrast in the elements of form, line, color and texture when compared with the existing characteristic landscape. Alternative E would meet Class II VRM objectives in all four elements.

4.6.5 Road Engineering and Transportation

The selection of Alternative E will result in some improvement to the road system but on a more limited basis than Alternative D. The existing road would be scarified, bladed and shaped and additional drainage dips built. Geotextile would be placed on the road surface from MP 0.7 to MP 1.17 and a twelve-inch lift of pit-run or grid-rolled rock placed over the geotextile. This would improve road condition and accessibility.

4.6.6 Recreation and OHV Use

There are no actions in Alternative E that would directly affect OHV use. All activities within the pit would continue as they have and the effects would be the same as in the No Action Alternative

The vegetation treatment proposed in Alternative E would potentially promote the proliferation of all classes of OHV use across the treatment area. Ground based logging systems that do not fully suspend the logs leave skid trails that are excellent for OHV travel and create the potential for more established OHV routes in the years immediately following the vegetation treatments.

Since the target basal areas are graduated up slope, it is likely that more OHV routes would develop at the lower slopes and fewer on the upper slopes where the forest would be thicker.

Alternative E would not include a buffer around the pit. This is likely to increase OHV use adjacent to and extending from the pit area. With the open forest structure, sight distance is improved and OHV users could potentially see hill climbing opportunities from the pit, and go search those out.

In the first year or two after the actions are performed, there would be little noticeable impact. In that time period, OHV users would be exploring the new skid trails. About five years after the actions, there would be a noticeable increase in tracks on new skid trails. OHV users would become familiar with various routes by then and bring along more users. In ten years, the projected increase in overall numbers of OHV users would be noticeable. More use on existing trails would be evident and there would be more trails being created.

4.6.7 Mining and Minerals

The actions of this alternative would probably have minimal impact on miners and mining operations. Complete removal of infested trees from the area should mitigate the potential loss of timber from bark beetles while leaving sufficient timber resources for mining-related purposes. In addition, tree thinning of the area should substantially reduce the wildland fire threat to miners, mining-related structures and equipment, and production time.

4.6.8 Range Management

There are no effects to this resource with this alternative.

4.6.9 Social and Economic

This alternative would treat bands across the mountain to different stand densities. The lowest band would present the least risk for catastrophic fire. This is the area of LCM adjacent to residences and urban areas. The next band, approximately 0.25 miles from the public/private boundary would be treated to a greater stand density than the first band, and so-on up the mountain. As the top of the mountain is approached forest stands would become progressively thicker. This treatment would leave the mountain looking more like pre-treatment conditions than other alternatives.

The amount of trees cut in this alternative would provide the potential to recover value from these bi-products of fuels thinning. The trees cut in this alternative would be worth an estimated 564 thousand dollars prior to processing.

There would be substantial road work done in this alternative. The main access road would be upgraded along its entire length.

Total cost of road work for Alternative E = $169,556 or $59,079/mile.

4.6.10 Wildlife

This Alternative would change the forest structure for wildlife species as described in Table 4.11.

Table 4.11 – Forest Structure for Wildlife

Basal Area	Estimated % Canopy Closure	Structural Definition	Estimated Treatment Acres	Estimated Non-Treatment Acres	Percent of Total	% Change from Existing
10-60	10-39	Open	1263	113	56	+27
60-120	40-69	Moderate	933	113	42	+10
120+	70-100	Closed	0	45	2	-37

Ten acres of conifer overstory removal would occur in riparian areas. While this would reduce the conifer component in the riparian area, this alternative would release some of the suppressed hardwoods potentially increasing the riparian habitat component.

Although additional road construction would increase road densities in the upland habitat component, the decreased road density in the riparian area would increase habitat security. This would benefit those species that utilize riparian areas.

Construction of 1 mile of new fence would increase the potential to disrupt normal movement patterns for big game, which, under extreme situations, may result in death from collisions, entanglement, or entrapment (Kindschy 1996). Proper fence design and use of appropriate construction materials can reduce the adverse effects of fences. Fence construction would reduce the grazing impacts currently observed in the riparian area and benefit those species that utilize riparian areas.

This Alternative would provide marginal cover for big game on approximately 113 acres (canopy closure of 40-69 percent) of treatment area and optimal canopy cover on approximately 178 acres (canopy closure greater than 70 percent). Treatment of areas adjacent to existing roads and trails reduces habitat security and increases the potential for disturbance and poaching of big game.

4.6.11 Fish

PACFISH (USDA FS and USDI BLM 1995) buffers will be implemented for all Riparian Habitat Conservation Areas (RHCAs).

The effect to the fisheries resource from PACFISH buffers is the assurance no activities would occur that would directly harm fish or riparian habitat, water quality, and/or channel stability. Since no stand management will be allowed inside the buffer, important components such as large wood, shade and channel stability would continue to be maintained at the present level in the short term. Long term, channel adjustments would continue to progress with the natural recruitment of large wood, riparian vegetation changes and flow regime. Overall, implementation of these buffers would be indistinguishable from the no action alternative.

Over time, natural recruitment of large wood and riparian vegetation would lead to channel complexity, eventually reaching the natural site potential and riparian management objectives. This site potential likely is limited by historic activity as well as existing and future disturbances caused by mining and associated access requirements. These activities are governed by the General Mining Act of 1872 and are independent of any proposed action for this project.

Likewise, no improvements to roads that are currently contributing sediment to the stream would result. The existing road crossings that may be producing adverse effects would not be closed or improved.

4.6.12 Hydrology

Peak flows may slightly increase under this alternative. Using Harris and Hubbard's regional equations, bi-annual peak flows are predicted to increase 2-3 percent. The hundred-year flood would increase 2-8 percent. (see Appendix Q)

The main road is currently in very bad condition in many areas, due to inadequate drainage and rutting due to high traffic levels. Rocking and Erosion-Proofing the main road will reduce sedimentation. The long term reduction of fines to Little Pine Creek will reduce the

amount of fines that fill in pools and create embedded riffles. These effects will begin to decrease as flood flows flush fine sediments out of the watershed.

Extensive research has demonstrated that improved designing, building, and maintaining of roads can reduce road-related surface erosion at the scale of individual road segments. Road improvements to the main road will include rocking, re-shaping, adding drain dips, and other improvements. (Gucinski 2000) However, the majority of the roads would continue to contribute approximately 240 tons of sediment to the streams every year.

4.6.13 Soils

The potential for ground based disturbance is similar to Alternative C. The intense burn probability is moderately low and is similar to Alternative C & F. Dead and dying trees will be targeted which should reduce further the intense burn probability. Erosion and sedimentation from roads, trails, and ditches is moderately high for this alternative.

The main haul road will be surfaced and armored with coarse rock to control rutting, puddling, and erosion. No cutoff roads will be closed and no erosion control practices will be installed on any other of the natural surfaced roads.

Hand pile burn impacts are high for this alternative. This alternative produces about twice the slash as Alternatives C, D & F. As with the other alternatives hand pile burning the slash will create a severe burn disturbance under the slash and could open up the area and promote increased OHV traffic over areas presently not used by OHV's.

This alternative targets mountain mahogany, cutting the decadent plants and scarifying 26 acres of the soil surface to provide a seedbed for mahogany regeneration. Scarifying could increase the erosion potential on the bare surfaced areas that are not covered or mulched. Weeds could also invade these areas if the mahogany does not regenerate rapidly.

4.6.14 Cultural Resources

There are no effects to this resource.

4.7 Alternative F

4.7.1 Fuels

The average basal area in the juniper plots would change from approximately 81.3 BA to 0 – 40 BA. The average basal area in the ponderosa-dominated plots would change from approximately 178.2 BA to 40 – 60 BA. In the mixed conifer sites the average basal area would change from approximately 164.0 BA to 60 – 80 BA. In the Douglas-fir sites, the basal area would change from an average of 145.5 BA to 80-100 BA. In some cases, the target basal area would already be met, and little or no treatment would be required.

Predicted fire behavior in the treated juniper stands would change from an average of 34 percent of the juniper stands initiating crown fire under 97th percentile conditions to 0 percent of the acres in the project area. In the ponderosa pine stands predicted fire behavior would change from an average of 64 percent initiating active crown fire to only 34 percent of the acres in the project initiating a conditional passive crown fire under 97th percentile conditions. In the mixed conifer stands predicted fire behavior would change from 100 percent initiating active crown fire to only 34 percent of the acres in the project initiating a conditional passive crown fire under 97th percentile conditions. In the Douglas-fir stands predicted fire behavior would change from an average of 34 percent initiating conditional passive crown fire to 100 percent of the acres in the project maintaining surface fire under 97th percentile conditions. In addition, as stated above, approximately 185 acres would be retained in pre-treatment condition to 100-150 BA to maintain wildlife habitat. These stands, although susceptible themselves to crown fire, would be scattered throughout the treatment area and the project site would still be managed for surface fire.

Although a few areas remain at risk for crown fire, for the most part, any crown fire advancing on the urban area would be expected to drop to the surface and burn with intensities that are safely and effectively managed by ground based suppression forces.

Curlleaf mountain mahogany would be targeted on the western slopes to reduce overall fuel accumulations. Mature, decadent mahogany shrubs would be cut and pile-burned to eliminate flammable material. In addition to the designated target basal area reductions, 185 acres would be left untreated at 100 – 150 BA as wildlife habitat. While no specific Wildland Urban Interface Zone would be designated, the low-end basal area target of the juniper and ponderosa pine stands, which naturally occur along the outer edges of the project area would effectively create a zone around Canyon City and nearby residences where the fuels would be managed for surface fire (flame lengths less than 4 feet.). Surface fire flame lengths can be safely manageable by ground based suppression forces under most conditions.

4.7.2 Entomology

Alternative F would leave about 185 acres at stocking densities above the UMZ and hence susceptible to bark beetles. From a landscape perspective, this is a small proportion of the stand in a susceptible condition, and should not impair the attainment of the management objectives for the project area. Instead, having a small residual portion of susceptible stand condition in Alternative F will provide a source of horizontal diversity in the LCM area where new snags will naturally occur and where foraging opportunities will be provided for species that utilize this habitat.

In areas where a very aggressive treatment is proposed (with residual basal areas of 0-40 square feet per acre), there may be even less basal area remaining after treatment than expected due to mortality from insects. If tree cover is important on those treated acres, it may be advisable to target the higher end of the proposed residual basal area ranges in order to compensate for some unexpected tree mortality.

Within five or ten years, the surviving residual trees should have sufficient resources to grow and be resistant to bark beetles as long as their basal areas remain below the threshold of 100 square feet per acre.

4.7.3 Silvicultural Resources

Targeting the dead and dying insect infested trees then thinning from below would be a major first step in gaining control of the current insect epidemic. Thinning these acres would not only remove most of the dead and dying trees but thinning from below would also discourage infestation of the remaining healthy trees that exist on the site since trees would be widely spaced. "Thinning is often necessary to prevent stagnation or excessive mortality due to suppression and to create vigorous trees and stands in the absence of insects and disease" (Cochran et al. 1994). The trees in this stand are currently stagnant, growth rates at 20-50 growth rings per inch and visual inspection shows mortality is excessive.

By reducing juniper dominated stands to a 0-40 basal area, these areas would become more conducive to ponderosa pine establishment. Ponderosa pine and occasionally Douglas-fir have been known to become established once competition for moisture has been reduced by removing juniper.

By reducing the ponderosa dominated stands to a 40-60 basal area, the remaining stand would be a variable 38 feet spacing. Spacing is dependent on diameter of the trees remaining (see Appendix F). Reducing the mixed conifer stands to a 60-80 basal area would result in approximately a 31 feet spacing. Reducing the Douglas fir dominated stands to an 80-100 basal area would result in approximately a 28 feet spacing.

Frequency of stand treatment re-entry would correspond directly with the intensity of thinning. Thinning to a higher basal area of 80-100 would require a more frequent re-entry than thinning to a lower basal area of 40-60, since the stand would return to the excessive basal area of 100+ sooner. "Basal areas around pine trees should be kept under 100 square feet per acre on poor sites" (Appendix F). Therefore, a re-entry into the Douglas-fir stands would be necessary within 10-15 years while a re-entry into the ponderosa pine stands would be delayed until approximately 20-25 years.

Removing the dead and dying would gain a varying degree of control of the fire hazard situation that currently exists within the project area. Removing these current and future hazard fuels would reduce the potential for fire intensity in the short term. The comprehensive treatment of removing infected trees and thinning from below would reduce the potential for fire intensity and crown fires in the long term. Ponderosa pine stands would be the most likely areas to withstand crown fires while Douglas-fir stands would be the least likely portion of the project area to withstand a crown fire.

4.7.4 Visual Resources

Implementation of this alternative would be expected to attract the attention of the common observer where ponderosa and mixed conifer stands are found on slopes

greater than 35 percent. This alternative proposes a sizeable change in basal area and tree spacing compared with existing conditions.

The potential exists for treatment areas with different thinning rates to appear as new forms in the landscape with noticeable outlines. However, carefully grading or feathering the perimeter of treatment areas, straight lines and right angles, reducing thinning rates on the northeast-southwest ridgeline, and incorporating visual screening and dead-tree retention in insect-infested areas would result in a weak contrast in the element of line.

The solid dark green color of the existing forest would appear as predominately gold, or white (during winter), dotted with dark green trees. This contrast in color would be particularly noticeable where insect-infected trees were removed, and in ponderosa pine and mixed conifer stands above 35 percent slope where heavier thinning would be more noticeable. The uniform texture of the existing forest would change to an uneven coarser texture caused by the many changes in thinning rates, appearing particularly sparse in ponderosa pine and mixed conifer stands on steep slopes.

The degree of visual contrast expected between this alternative and the existing landscape, would be weak in the elements of form, line, color and texture. Alternative F would meet Class II VRM objectives in all four elements.

4.7.5 Road Engineering and Transportation

The selection of Alternative F will result in further degradation of the road system because there will be no road reconstruction, closures, or improvements. There will continue to be ruts and the mudholes will continue to get worse because of continued commercial and recreational use of the roads and limited maintenance on them.

4.7.6 Recreation and OHV Use

Alternative F would close the pit to full size vehicles at both the north entrance and the southeast entrance (see Appendix I), closing off the pit to trash dumping. This would impact different classes of OHV's in different ways. For Class I/III OHV's it would improve the site by reducing the health and human safety hazards presented by having garbage in the pit. It would not reduce the riding opportunities for Class I/III OHV's.

By placing the barriers 50 inches apart, Class II OHV's would be excluded from gaining entrance to the pit at either the north or southeast entrances. This would likely decrease the use by Class II OHV's in the pit. However, it would not completely eliminate Class II OHV's because there are other, more technically challenging, ways to access to the pit. It is likely that committed Class II OHV users would find other ways to gain entrance to the pit. For others that are less committed, it is possible that the barriers would be enough to deter them from mud bogging or dumping garbage in the area altogether.

Alternative F would create a 100-250 foot buffer around the pit. The intent would be to limit the sight distance for OHV's that are recreating in the pit. This would help prevent

creation of new routes out of the pit area. Additionally, this buffer could act as a sound and dust barrier to nearby landowners.

The vegetation treatment proposed in Alternative F would potentially promote the proliferation of all classes of OHV use across the treatment area. Ground based logging systems that do not fully suspend the logs leave skid trails that are excellent for OHV travel and create the potential for more established OHV routes in the years immediately following the vegetation treatments.

The target basal area for Alternative E ranges from 0-100 BA depending on the stand characteristics. In those stands with lower basal area, the potential for OHV trail proliferation would be greater than for those stands with greater basal area. The "thickets" for wildlife cover could also reduce the potential for OHV routes because they would minimize sight distance.

In the first year or two after the actions are performed, there would be little noticeable impact. In that time period, OHV users would be exploring the new skid trails and discovering new ways to gain entry into the pit. About five years after the actions, there would be a noticeable increase in tracks on new skid trails and substantially more use on alternative routes into the pit. OHV users would become familiar with various routes by then and bring along more users. In ten years, the projected increase in overall numbers of OHV users would be noticeable. More use on existing trails would be evident and there would be more trails being created.

4.7.7 Mining and Minerals

The actions of this alternative would have minimal impact on miners and mining operations. Complete removal of infested trees from the area should reduce the potential loss of timber from bark beetles while leaving sufficient timber resources for mining-related purposes. In addition, tree thinning of the area should substantially reduce the wildland fire threat to miners, mining-related structures and equipment, and production time.

4.7.8 Range Management

There are no effects to this resource.

4.7.9 Social and Economic

This alternative would treat similar vegetation areas across the mountain to different stand densities. The areas nearest the public/private boundary would be treated to the lowest stand densities and would present the least risk for catastrophic fire. The other areas on the mountain would all be treated to lower fire risk. Due to the delineation of treatment areas the post-treatment conditions have the potential to look more patchy than prior to treatment.

The amount of trees cut in this alternative would provide the potential to recover value from these bi-products of fuels thinning. The trees cut in this alternative would be worth an estimated 442 thousand dollars prior to processing.

4.7.10 Wildlife

This Alternative would change the forest structure for wildlife species as described in Table 4.12.

Table 4.12 – Forest Structure for Wildlife

Basal Area	Estimated % Canopy Closure	Structural Definition	Estimated Treatment Acres	Estimated Non-Treatment Acres	Percent of Total	% Change from Existing
10-60	10-39	Open	1235	113	58	+29
60-120	40-69	Moderate	708	113	36	+4
120+	70-100	Closed	92	45	6	-33

This Alternative would provide the greatest diversity for wildlife. Treating forest stands based on habitat type and leaving 185 acres of with a higher basal area would provide the greatest diversity of habitat and structure, and have more of a mosaic appearance, than any other Alternative.

This Alternative would provide marginal cover for big game on approximately 701 acres (canopy closure of 40-69 percent) of treatment area and optimal canopy cover on approximately 137 acres (canopy closure greater than 70 percent). Treatment of areas adjacent to existing roads and trails reduces habitat security and increases the potential for disturbance and poaching of big game.

4.7.11 Fish

PACFISH (USDA FS and USDI BLM 1995) buffers will be implemented for all Riparian Habitat Conservation Areas (RHCAs).

Road maintenance would be limited to shaping the road surface to better facilitate vehicle traffic and reduce channelized flows on the road surface. Cutoff roads would continue to contribute sediment and flow to the drainage ditches on the main road.

The effect to the fisheries resource from PACFISH buffers is the assurance that no activities would occur that would directly harm fish or riparian habitat, water quality, and/or channel stability. Since no stand management will be allowed inside the buffer, important components such as large wood, shade and channel stability would virtually continue to be maintained at the present level in the short term. Long term, channel adjustments would continue to progress with the natural recruitment of large wood, riparian vegetation changes

and flow regime. Overall, implementation of these buffers would be indistinguishable from the no action alternative.

Maintenance of the main road will reduce channelized flow and subsequent sediment delivery to the streams and tributaries for a short period of time. However, the native surface will deteriorate rapidly during precipitation periods and rutting will result. Channelized flows and sediment will continue to retard recovery of Little Pine Creek because of channel adjustments and degraded pool habitat.

Over time natural recruitment of large wood and riparian vegetation would lead to channel stability, eventually reaching the natural site potential and riparian management objectives.

This site potential likely is limited by historic activity as well as existing and future disturbances caused by mining and associated access requirements. These activities are governed by the General Mining Act of 1872 and are independent of any proposed action for this project.

Likewise, only maintenance improvements to roads that are currently contributing sediment to the stream will be a short-term improvement. The existing road crossings that are producing sediment would not be closed or improved.

4.7.12 Hydrology

More snow accumulates in sparsely stocked forest stands and in small clearings in forest stands than in dense conifer stands. These greater accumulations can contribute to increased runoff, particularly when such increases occur in areas that already have wetter soils. Selective thinning can increase snow accumulation in an estimated range between 6 and 15 percent, while heavy thinning and commercial clearcuts can increase snow accumulation between an estimated 15 and 29 percent. (Anderson et al. 1976) If no snow is present on the forest canopy when rain occurs and rainfall rates exceed 5 mm/hr, clearcut areas yield more water than forested areas once the snowpack is ripe (warm). (Berris and Harr 1987) Wind accentuates these differences. Maintaining a diversity of cover conditions on a watershed can moderate the effects in either scenario.

Clear cutting estimates for areas east of the cascades place potential annual water yield increases at 0.5 and 1 inches for ponderosa pine and Douglas-fir, respectively. That is about a 13 to 15 percent increase in mean annual stream flow. (Anderson, 1976).

If patch cutting in eastern Oregon results in a proportional smaller increase in water yield, ponderosa pine and Douglas-fir will experience a 7 to 8.5 percent increase in peak flows from Patch cutting.

4.7.13 Soils

The ground based logging impacts for this alternative are lower than Alternatives C, D or E but are higher than Alternative A and B. The intense burn probability after treatment would be similar to Alternatives C and E, moderately low. Dead and dying

trees would be targeted along with thinning decadent mountain mahogany, both of which would help decrease further the intense burn probability.

Thinning juniper would improve the grass and shrub component of the under story and would help improve water infiltration into the soil. Erosion and sedimentation from roads, trails, and ditches is high, similar to Alternatives A, B and C.

Hand pile burn impacts would be moderately high, similar to Alternative C and D, lower than Alternative B and E and higher than Alternative A. The hand pile impacts could be slightly higher than Alternative C due to the increased amounts of thinned mahogany proposed for this alternative. As with the other alternatives hand pile burning the slash will create a severe burn disturbance under the slash and could open up the area and promote increased OHV traffic over areas presently not used by OHV's thus increasing existing road and trail erosion.

4.7.15 Cultural Resources

There are no effects to this resource.

4.8 Cumulative Effects

4.8.1 Past Management

4.8.1.1 Fuels

In the past, attempts have been made to exclude fire, primarily through fire suppression. This has had an effect on the distribution and composition of vegetation in the project area. Historical documentation, both written and photographic, indicate that the project area was primarily composed of shrub-steppe vegetation (sagebrush, bunchgrasses, etc.) with occasional ponderosa pine dominated timber stands extending approximately ½ mile from the top of Little Canyon Mountain down into drainages where they established along a moister gradient. Very few, if any, western juniper were present in the project area.

Fire scar analysis documents fire, in the form of low-intensity underburning, as a normal part of the ecosystem in the Blue Mountains for the last 300 years. Although a natural component of forests and grasslands, fire has been excluded for the last 100 years (Hall 1990). In an historic situation for the project area, lightning started a fire that would burn slowly through grass and needles to ponderosa pine trees, and would slowly consume the bark and branches of smaller diameter trees. This slow, hot fire often had three results: "a mineral seedbed [was] provided for pine regeneration, fire carrying grasses and litter [were] eliminated so underburning [was] avoided for two to three fire cycles, and grass competition [was] greatly reduced. During this 20-30 year period, ponderosa pine could grow large enough in diameter to withstand underburning and pinegrass and elk sedge would extend their rhizomes back into the charred area to again carry fire" (Hall 1990). With this type of continuous fire

insertion into a ponderosa-dominated ecosystem, only five trees need to become established per acre every 35 years. Without fire, ponderosa stands are not periodically thinned, and thousands of young trees become established. The establishment and growth of ponderosa pines in the understory has also "reduced spatial diversity and created fuel ladders to the taller trees" (Agee 1993). Over time these stands stagnate, and become dense and unhealthy; susceptible to disease and parasite infestations and attack from wildfire.

On the lower slopes of LCM, historical documentation points to grassland and sagebrush-steppe communities. Shrub-steppe communities are usually dominated by a variety of shrubs and perennial grasses. "Forest vegetation is generally confined to mountain slopes with sufficient precipitation, either regionally (e.g. approaching the Rocky Mountains) or locally (e.g. higher elevations on interior ranges such as the Blue Mountains)" (Franklin and Dyrness 1988). These communities typically experienced a fire return interval of approximately 25-35 years. Although fire severity may have been moderate to severe, the plants in these ecosystems have adapted. Instead of being eliminated, grassland and mountain shrub communities are generally top-killed and are able to resprout. Fire exclusion and other activities (e.g. grazing) since the area was settled by Europeans has led to an overall decrease in the shrub-steppe ecosystem and the expansion of both ponderosa pine (primarily east/north sides) and western juniper (south/west sides) communities.

With the exclusion of fire, western juniper has greatly expanded in the project area over the last 100 years, occupying much of the southwestern and western slopes of the project area. Western junipers are extremely fire intolerant as seedlings and natural fires have had a strong influence on the distribution of this species. Although they traditionally occupied rocky outcrops and other fire-resistant sites, changes in the frequency of wildfires have allowed juniper to rapidly move into other communities without check. During the "rapid-population growth phase at the turn of the [twentieth century], the western juniper populations on the big sagebrush sites were doubling every 3 years" (Young and Evans 1981). As a result, numerous stands have established in the valleys and foothills of the Blue Mountains, including the LCM project area.

In addition to management activities that have altered the vegetation in the project area through fire exclusion, other management activities have had additional impacts in the project area, although to a much smaller degree:

- Roads have been created throughout much of the project area, serving not only as access for recreation and mining, but also as suppression access, as well as public access with the potential of creating accidental or intentional fire starts.
- Historical and current logging operations within the project area, while limited, have removed some of the available timber. This timber has been used historically for the town of Canyon City, and more recently as supports for mining shafts.
- Combined efforts from the BLM and local landowners have created a small fuel break at the Wildland/Urban Interface boundary. The current BLM fuel break project has reduced fuel loads by pre-commercially thinning approximately 70 acres along the northern edge of the project area. In conjunction with these activities, local landowners have taken measures to clean and thin their own properties and create defensible spaces.

4.8.1.2 Entomology

During the early 1980's the spruce budworm infested a stand of Douglas fir. The active removal of these dead and dying Douglas fir trees (through firewood permits) resulted in confining this insect epidemic to an area of approximately 5-10 acres. There have not been any actions taken that mitigate the presence of insects or pathogens in the area since.

4.8.1.3 Silvicultural Resources

The LCM forest stand has recently (October 2002) been pre-commercially thinned along the north boundary between BLM and seven private residences. This fuel break treatment consisted of removing most juniper trees, pre-commercial thinning (less than 12 inches DBH (diameter breast height)) live trees to a 12 foot by 12 foot spacing, pruning all live and dead trees up to 8-10 feet above the ground, removing most brush (except broad leafed trees), and hand piling all slash (existing and newly created) less than 9 inches DBH. This action was intended to be the first step in creating a firebreak along this urban interface.

Beyond this treatment, there have not been any actions taken that reduce the presence of insects or pathogens in this ponderosa pine stand. However, a one-time entry, over story removal did take place on 145 acres in 1967. A total of 541 thousand board feet (mbf) of ponderosa pine was removed. This type of harvest activity was intended to remove potential hazard trees from the forest in order to provide a safe environment for the mining and recreational activities within the area.

Prior to 1967 some harvest of younger trees had taken place. Mining activities (1860's – 1930's) used some of the tree vegetation to produce timbers for the mining operations. Since the 1960's non-commercial firewood permits have been issued. These firewood permits allowed for the removal of dead Douglas-fir trees. The most prominent firewood area is above the spring area in Section 7.

In 1998-1999 a salvage timber sale was completed to remove dead trees on the southern face of Little Canyon Mountain.

Also, current mining activities occasionally require the use of Douglas-fir trees for producing mining timbers. Douglas-fir materials are stronger and longer lasting than ponderosa pine when the processed logs are used as support timbers in mining tunnels, etc. Occasionally, when Douglas-fir trees are not present on a mining claim, that particular mining operation may require the removal of ponderosa pine trees which are then exchanged to a local sawmill for finished Douglas-fir timbers.

4.8.1.4 Road Engineering and Transportation

Ever since the discovery of gold in the area new user-created roads have been appearing across the landscape to access various areas. LCM has received its share of these roads.

On the eastern portion of the project area road densities exceed 8 miles per square mile. Most of these roads were not designed to minimize environmental damage, nor are they typically maintained. This has created redundant roads and widen of existing roads to avoid problem spots. OHV use has increased in recent years and so have the number of OHV trails on LCM.

4.8.1.5 Recreation and OHV Use

The Little Canyon Mountain Project Area (LCM) is currently designated as open to motorized travel and was designated as such by the John Day Resource Management Plan (Appendix I). In the management plan, 121,945 acres were designated as open. 49,652 acres were designated as restricted and identified for seasonal closures to enhance wildlife habitat in the cooperative road management areas. The final 10,523 acres are located in a wilderness study area, which are closed to OHV's (USDI BLM, 1985). Within the management plan, no differentiation was made between the three classes of OHV's. Therefore these acreages apply to all OHV's: Class I, quads or three-wheelers; Class II, 4x4's, jeeps, dune buggies; and Class III, motorcycles (State of Oregon, 2001) (See Appendix I).

Part of the purpose and need for the John Day Resource Management Plan (RMP) Record of Decision was to "identify public land as open, closed, or limited for off-road vehicle use (Executive Order 11989)" (USDI BLM, 1985). This is the only reference to OHV's in the purpose and need. The Draft Environmental Impact Statement named areas around Canyon City and John Day as areas that had heavier motorized use; however no mention of motorized recreation is made in the estimated recreation visitation table (USDI BLM, 1984). No specific management actions were taken to address OHV use in these areas of "heavier use." Nor have there been any specific management actions for OHV's in the area since that time.

4.8.1.6 Mining and Minerals

Placer mining in the LCM area began in the summer of 1862 with the discovery of gold. The earliest mining operations focused on the gravel bars along Canyon Creek and in the surrounding gulches (Brooks and Ramp, 1968). In subsequent years, lode deposits were discovered on the upper slopes of LCM; one such deposit was discovered at the Great Northern Mine in 1898 (Lindgren, 1901; Brooks and Ramp, 1968). Relative to placer mines, production from the lode mines has been small.

Reliable gold production figures from the LCM area during early years are not available (Lindgren, 1901). Between 1862 and 1908, an estimated 600,000 ounces of gold were produced from the entire Canyon Mining District, which includes areas outside of LCM (Thayer et al. 1981). Production was highest in 1862 with an estimated 90-94 percent decline over the years following until 1870. From 1871 to 1908, production remained relatively constant at 2-4 percent that of the 1862 levels. By 1916, production was nearly insignificant (Brooks and Ramp, 1968). The use of

dredges in Canyon Creek and in the John Day valley around the city of John Day revived production from 1916-1929 and from 1935-1942. The combined output of the dredging operations was 124,000 and 13,000 ounces of gold and silver respectively (Brooks and Ramp, 1968; Thayer et al. 1981). Relatively small amounts of gold have been produced from the Canyon Mining District since the last dredge was dismantled in 1942.

Mineral management of LCM began in 1862 with the first miners to work the gold deposits of the area (Oliver, 1962). Owing to the absence of established law and issues concerning claims, the miners drafted their own code of laws. These laws designated a recorder to keep a record of claims, specified the types and dimensions of claims, circumstances constituting claim abandonment, how often claims must be worked, and how many claims a miner could hold.

In 1866, the Federal Government took over mineral management on public lands. Congress passed the 1866 Mining Act designating recognition and protection of existing claims and declaring public lands open to mineral entry for any United States citizen. Included in the law were provisions for claimants of lode deposits to obtain title by patenting; the Placer Act of 1870 amended the 1866 law to allow patenting of placer claims. In 1872, Congress combined the mining laws into a single statute known as the United States Mining Act of 1872 (Kesler, 1994). The Federal Land Policy and Management Act was passed in 1976, requiring the BLM to prevent unnecessary or undue degradation of public lands from hardrock mining. To this end, the BLM published the 43 CFR 3809 surface mining regulations in 1980, which took effect in January 1981 (USDI BLM, 2000a). Efforts were made in 1991 to amend the regulations, but congressional consideration of major reforms to the 1872 Mining Law held up this action for several years (USDI BLM, 2000b). A final rule updating the "3809" regulations took effect on January 20, 2001; further modifications in another final rule took effect on December 31, 2001 (USDI BLM, 2001). Most provisions of the January 20, 2001 mining regulations were retained while several "unduly burdensome" provisions were removed.

None of the public lands within the LCM area have been withdrawn from mineral entry. Thus, mineral resources in the area have been managed according to the 43 CFR 3809 regulations and the mining laws to prevent unnecessary or undue degradation of public lands while providing for economic mineral development.

4.8.1.7 Range Management

The BLM administers three grazing allotments on LCM. Each of these allotments contains a limited amount of forage. Grazing has been sporadic and oftentimes does not occur at all on a year-to-year basis.

4.8.1.8 Social and Economic

Gold was discovered in Canyon Creek in 1862 and marked the beginning of a economic boom in the area which saw $ 26 million worth of gold taken from the John Day and Canyon city area (GCCC 2003). By 1870 the mining boom was beginning to fade and other commodity uses in the valley were on the rise, including: farming, ranching and logging. By the 1940's the logging industry became the largest industry in the county, bigger than mining, farming and ranching. The logging industry remains the largest employer in the county (GCCC 2003).

Mining has occurred in most areas throughout the upper John Day basin, including Little Pine Creek and Canyon Creek, adjacent to Little Canyon Mountain. The streams in this area were heavily impacted and still show signs of historic mining in the form of altered channels and mine tailings in the flood plain. Mineral extraction as seen in this area is typically short-lived with most of the valuable minerals removed in a few short years after discovery. Limited mining still occurs on Little Canyon Mountain on several patented claims and numerous other claims.

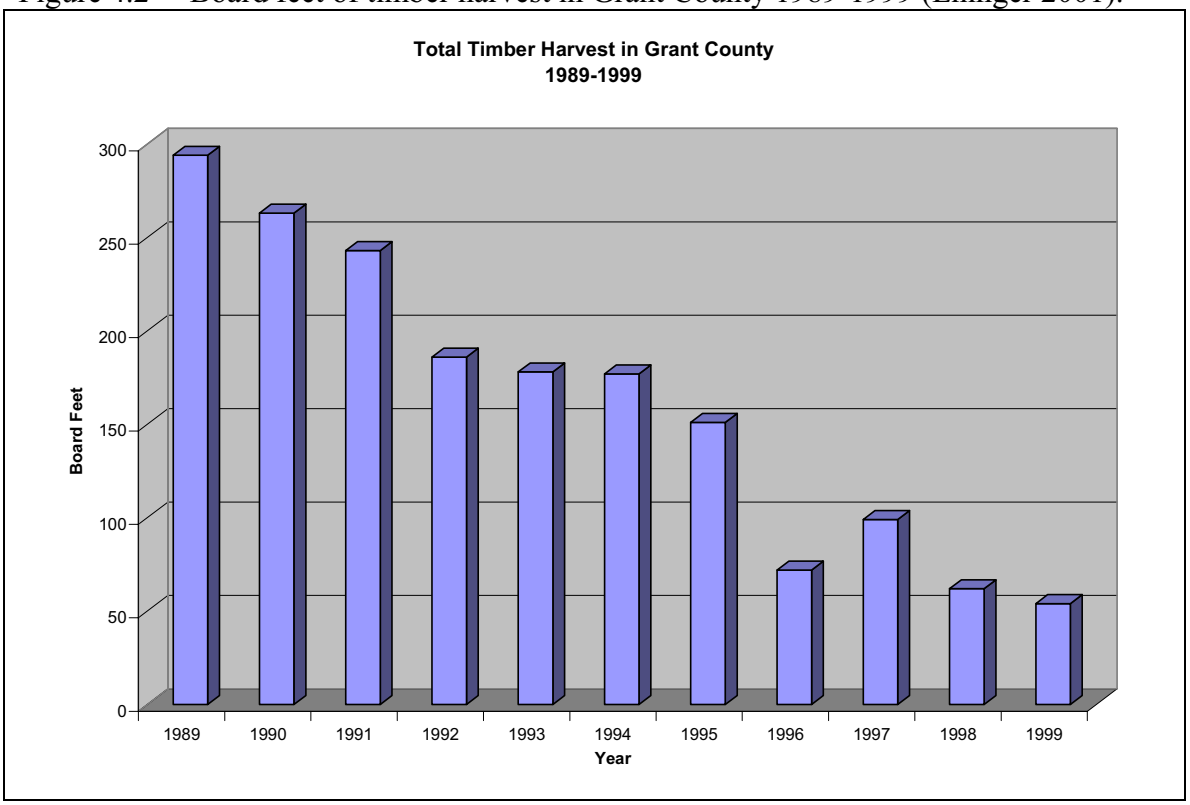
Numerous roads and trails also exist on Little Canyon Mountain, mostly on the east side. These roads were typically created to access mining areas as claims were established. Over time a dense network of roads has emerged on the mountain. The main access road connects the county road and the Canyon Mountain Trailhead located on the Malheur National Forest adjacent to the Strawberry Wilderness Area.

As the economic viability of mining waned other commodity uses such as farming, agriculture and logging increased in their economic viability in the area. By the 1940's logging was the largest industry in the county. However, as shown in Figure 4.2, the economic viability of timber harvest in the county has substantially decreased in the last decade.

Little Canyon Mountain itself has not been substantially logged. Several small scale tree removals occurred in the late 1960's in response to an outbreak of the spruce budworm. More recently in the mid 1990's, after a wildfire on the southern slopes of the mountain caused substantial tree mortality, a salvage harvest operation was completed.

Other wildfires have occurred adjacent to the area in past years. The potential for fire occurrence along with the increasingly severe effects of fire in overstocked forests adjacent to communities and homes, as witnessed in the 2000 and 2002 fire seasons nationwide, is of high concern to the residents of Canyon City and John Day.

Figure 4.2 – Board feet of timber harvest in Grant County 1989-1999 (Ehinger 2001).



4.8.1.9 Wildlife

The settlement of Europeans in the west and the impacts of that arrival forever changed the landscape for fish and wildlife species, both historically and currently, serving as an umbrella category for most other impacts.

Mining: Road development to mining sites, and laws protecting that access have perpetuated disturbance to wildlife and habitat. Most activities are not related to mining, such as off-road vehicle recreation, hunting and shooting. These activities create garbage deposits, additional unauthorized cross-country OHV trails, and increased human presence. Therefore, mining activity has provided for opportunistic use of LCM by development outside of the study area.

Housing: The Marysville area has filled in over the years with hobby farm ranchettes. The associated pastures have not only attracted deer and provided forage, but have also created

conflicts with deer. While the tolerance level for deer damage has been fairly high, normal deer winter range has been converted from native browse to more appealing less nutritious sources. Elk use is not recorded for the area. Further development is expected to proceed more slowly, unless a plat is subdivided or partitioned, making more lots available.

Roads: Rugged terrain has limited development to creek bottoms such as Dog Creek and Little Pine Creek. Only the most severe winter conditions will force all deer to the open foothills.

BLM-owned property is mostly transitional range that will provide adequate habitat to support deer that are not wanted at lower elevations with human habitation. Reduction of road mileage on LCM to mitigate a more open plant community through timber harvesting will help support such use.

Timber harvest: Recent harvest on the northern boundary has been directed at improving forest health, which under ODF rules would remove all diseased, dead or dying trees, and leave an 18 to 30 foot uniform spacing. ODF forest practices have little consideration for wildlife impacts. Numbers of large diameter dead/down, standing/replacement snags, are needed for woodpecker foraging and nesting habitat in the battle to control insects organically. Large down material is important for microbial processes and small mammal/amphibian habitat. Wildlife travel corridors leaving BLM canyons and draws will be compromised by private lands harvest, and should be left intact where possible (in addition to dispersed cover patches).

Riparian: Implementation of PACFISH buffers, road relocation on Little Pine Creek, and conifer thinning, as proposed, would maximize benefits of BLM ownership to the riparian zone, and provide higher quality water to the watershed. Streambank degredation, channelization, and livestock contamination are probably the greatest impacts downstream.

4.8.1.10 Fish

Historic and current mining activity and later agriculture development created diversions of Little Pine Creek water. Water rights currently exist from Little Pine Creek for both mining and irrigation, which reduce flows in the stream and lead to connectivity problems for fish and habitat.

4.8.1.11 Hydrology

Historic mining and logging, wildfire, and wildfire suppression have disturbed the Little Canyon Mountain Watersheds.

WATERSHED COVER

A century of wildfire suppression has changed the ponderosa pine and dry mixed conifer ecosystem on Little Canyon Mountain. These areas, which historically experienced frequent low intensity surface fires, have accumulated living trees and debris. The stands are densely stocked with small diameter trees. This accumulation of fuels sets up conditions for a stand replacement fire (see Effects of No-Action Alternative). In addition, this dense watershed cover alters the historic hydrology by intercepting and evaporating snow and other precipitation, which would normally be absorbed by soils and the forest floor.

While watershed cover has been most obviously modified by fire suppression, wildfire and harvest activities have removed some over-story conifers. Recent burning and harvest are evident on the South side of Little Canyon Mountain. In 1999, a fire burned 119 acres thereby altering a portion of the watershed cover in the south side drainage. The fire severity varied and the burn created a "patchy" appearance across the landscape. That winter, the area was logged. The logging operation created a large landing that has since been planted with pine seedlings. Between ten and twenty percent of the trees of each diameter class were left standing. Some green trees were thinned, and seedlings were planted to restore watershed cover. (Vidourek 2002)

A portion of the watershed's vegetative cover was also removed by a wildfire in 1987. The stand replacing fire burned 132 acres (5 percent of the watershed) in the headwaters of Little Pine Creek watershed. The burned areas still appear deforested on 2002 aerial photography. It is likely that this severe fire resulted in erosion and sediment delivery into Little Pine Creek that continued for several years after the fire. Today, the area is beginning to recover, but still lacks the large conifer overstory of the surrounding forest (see August 2002 photo below).

MINING AND SETTLEMENT

Mining seriously affected many streams in the John Day Basin. Portions of Canyon Creek near Canyon City were dredged. When Highway 395 was build next to Canyon Creek it caused the creek to become further entrenched. This important highway still constricts Canyon Creek. As Canyon City has aged, Canyon Creek has become increasingly confined and prohibited from accessing its floodplain. However, flooding does occasionally afflict the residents of Canyon City.

Beginning around 1862, Little Pine Creek was hydraulically mined. This involved creating ditches to wash gold-bearing gravels through a sluice. This method was especially destructive to stream channels and floodplains. Water was ditched from Dog Creek and Little Pine Creek to the site of the placer. This increased the stream power flowing down Little Pine Creek and the other drainages where the water was used. When the stream channel had been exhausted of gold, the vegetation of the floodplain was removed. The miners worked their way back and forth across the floodplain sifting through the sediments for gold. The finer soil would have been washed downstream and large cobbles were piled to the side as tailings (LaLande 1985). These are still evident today in Little Pine Creek. Tailing piles are scattered up the valley on Little Pine Creek's floodplains. The later use of monitors to hose down the slopes created steep headwalls along the streams.

Historic photos and survey notes indicate that Canyon Creek was heavily vegetated with riparian vegetation including willows and cottonwoods in the late 1800s. Some of the cottonwoods were cut down to build houses. A surveyor's note from 1880 states: "This line runs along the north slope of Canyon City Mountain. The timber has all been cut off and there is a dense growth of brush and small pine. The country is very rough, rocky, mountainous and broken, Soil 2nd rate" (Robb 1880, south side section 1). This would indicate that trees in the Whiskey Gulch watershed were harvested in the late 1870s to provide wood for the mills located on Big Pine Creek and especially for the mill upstream from Canyon City. Today, little evidence of this activity remains. The extent of the disturbance to the watershed is difficult to quantify, but important to note. Any resultant ground disturbance is overshadowed by the disturbance created by the mining activities. It is difficult to estimate how the watershed is affected by this historic removal of 12 to 18 inch trees.

4.8.1.12 Soils

Fieldwork for the Grant County, Oregon Central Part soil survey was completed from 1960-1975. This survey reflects the conditions in the survey area in 1975. Little Canyon Mountain is a part of this survey area (Dyksterhuis 1981).

Fifty percent of the Little Canyon Mountain (LCM) area has been impacted in the past from mining activities. Soils have been altered extensively due to road building access for mining exploration, placer and hydraulic mining activities and logging. Recreational motorized use has further impacted the area creating many rutted natural

surface roads and trails. The hydraulic and placer mining activities have occurred in the alluvial drainages and alluvial fans mostly in the northeast part of the area.

Fires have recently occurred on the south and east side of the project area. The south side fire appeared to be of moderate intensity and was spotty. Salvage logging and some thinning occurred with this fire and the existing road network was used. A cable operation was used; the landings were piled, burned, tilled and re-planted with trees. Soil compaction was not a concern for this operation. The east side fire area burned hotter and was a stand replacement fire. This area was not reseeded or salvage logged.

Most recently, an under story stand thinning operation was completed adjoining private land. Shrubs and small trees were cut and hand piled. These piles would be burned later this winter.

4.8.1.15 Cultural

Knowledge of the cultural resources on and around LCM comes from small inventories conducted by federal archaeologists related to federally initiated actions. These actions include land exchange, wildland fire rehabilitation and salvage logging, firewood cutting, road improvement, and Wildland Urban Interface fuels reduction. As a result of these inventories numerous features and sites related to the historic and current mining eras were recorded or noted. Only one prehistoric archaeological site has been located and recorded on LCM. Most of the information pertaining to the history of Canyon City and the Canyon District is captured in several published references (David 1869; Robb 1880; Lindgren 1901; Anonymous 1902; Oliver 1962; and Brooks and Ramp 1968).

Past actions occurring within the LCM project area include:

- LCM Timber Sale 1996
- Little Canyon Salvage Timber Sale 1999
- Wildland Urban Interface Hazardous Fuels reduction 2002

4.8.2 Adjacent Private Lands Management

4.8.2.1 Fuels

The Malheur National Forest (Strawberry Wilderness Area) abuts the project on the southeast side, and private land borders the rest. In recent history, two fires have burned adjacent to and in portions of the Little Canyon Mountain area. In 1987, the Little Canyon Fire burned approximately 135 acres in the wilderness and along the southeast corner of the BLM land in the project area. This fire burned under severe conditions, and the majority of acres burned under passive and active crown fire behavior. As a result, much of the overstory and understory vegetation was burned completely, and the area, although recovering, is still open. In 1999, the Byram Gulch fire burned up from the Harris Ranch just southwest of the project area, and into the

southwest side of Little Canyon Mountain. This fire burned in May and, while it burned intensely, did not initiate a sustained crown fire. A salvage logging operation was conducted after the burn to remove dead and dying trees and to reduce downed fuel loads in the burned area.

4.8.2.2 Entomology

It is likely that the pine forests on adjoining lands are also experiencing some tree mortality due to the dry conditions we have had in recent years. There has been a substantial upward trend in pine mortality throughout the forests east of the Cascades in the past two or three years.

Adjoining private lands to the north and east of this project area are also experiencing tree mortality due to this insect infestation. Some private landowners have treated their stands over the past 1-10 years by reducing tree densities and by treating slash in an effort to reduce brood sites for these insects. As a result, the private land insect infestations are much less extensive than the infestation within the LCM project area.

4.8.2.3 Silvicultural Resources

In addition to salvage logging, some logging is being conducted on private lands adjacent to the north/northeast side of the project area. Other private landowners, in response to the need to reduce the risk of wildfire to the Canyon City area and their own properties, have also been removing the dead and dying beetle-infested trees from their properties, as well as reducing overall fuel loads.

4.8.2.4 Visual Resources

An expanded view, beyond the project area boundary, reveals a landscape that is generally characteristic of the forested mountains and grassy hills surrounding the John Day River valley. In this broader-scope landscape, the majority of private lands show evidence of past vegetative management, including selective timber harvest, clear cut areas, juniper cuts and clearing of trees and shrubs for agricultural purposes. The public lands of the Strawberry Mountain Wilderness (USFS) show visible effects of wildfire interspersed with unharvested forest areas. When viewing the public lands of LCM, the common observer is not likely to notice evidence of timber harvest activity. (Although some harvesting has occurred over the past few decades, it does not attract attention.) LCM, with no visible signs of vegetative management or wildfire, appears as an anomaly within the characteristic landscape.

4.8.2.5 Road Engineering and Transportation

Although a complete assessment of roads in Grant county was not completed for this project, adjoining lands to LCM have received the same type of historic use and roads have been created to provide access. In many areas timber harvest on private lands has lead to the creation of additional access roads as well.

4.8.2.6 Recreation and OHV Use

Currently, there are no other OHV opportunities on private lands or Forest Service lands immediately adjacent to the project area. The Strawberry Mountain Wilderness, adjacent to the project area, on the Malheur National Forest (NF) is 68,700 acres of land closed to motorized travel.

The closest designated OHV riding areas are Blue Mountain on the Malheur NF, Prairie City on the Malheur NF and Unity on the Wallowa-Whitman NF. Blue Mountain consists of 3 trails within a 10-mile radius of John Day, all are more difficult and total 16 miles open to Class I/III OHV's. Prairie City includes 6 trails with a total of 26 miles ranging from easiest to most difficult. These are located about 20 miles southwest of Unity and are designed for Class I/III OHV's. The Unity trails are also designed for Class I/III OHV's and are located about 8 miles away from Unity. The trails total about 60 miles (OPRD 2001).

4.8.2.7 Mining and Minerals

The adjoining lands to the LCM area are very much the same with respect to mineral resource condition and environment. Gold placer deposits are located in Canyon Creek and the John Day River west and north of LCM (Brooks and Ramp, 1968). Placer and lode deposits are located in the Prairie Diggings to the east at the base of Canyon Mountain. Another gold lode deposit is located on Miller Mountain to the southwest. Similar deposits of serpentine, nickel, platinum-group metals, and quartz also occur on adjoining lands. Other minerals on adjoining lands include chromite, copper, and mercury; geothermal resources are also present.

Deposits of chromite (ore of chromium) are located on the northern slopes of Canyon Mountain and on the west side of Canyon Creek. Individual chromite deposits, ranging from a few hundred kilograms to 115,000 tons, occur as pods and lenses in peridotite, dunite, and serpentinite (Thayer, 1940; Thayer et al. 1981). At least 100 chromite deposits are recognized but most occurrences contain less than 100 tons.

Historically, the chromite deposits of Grant County have not been able to compete with foreign sources with the exception of the three time periods of war (Thayer et al. 1981). Mining of the chromite deposits began in 1916 when World War I cut off chromium imports and continued until the war's end in 1918. Production resumed in 1939 and continued through most of World War II, ending in 1944. The last phase of production occurred from 1951 to 1958 as the U.S. government stockpiled strategic minerals during the Korean War (Thayer et al. 1981; Orr et al. 1992). In all, chromite production in Grant County reached 30,000 tons.

Copper deposits are found chiefly on the Strawberry Range crest between the summit of Canyon Mountain and Indian Creek Butte; a few other deposits occur just outside the western boundary of the Strawberry Mountain Wilderness (Thayer et al. 1981). Chalcopyrite, malachite, and chrysocolla are the primary copper-bearing minerals and occur

mainly in lenticular quartz veins placed in gabbro host rock. All known copper deposits in the area are either too small or have an insufficient grade for production.

Mercury was discovered in 1963 near the confluence of the East Fork of Canyon Creek and Canyon Creek (Thayer et al. 1981). Cinnabar (ore of mercury) occurs as fracture fillings and replacements in greywacke host rock. Production from the deposit totaled 3,830 kg between 1963 and 1968.

One hot spring and two warm springs around the Strawberry Mountains suggest the presence of geothermal energy (Thayer et al. 1981). The Blue Mountain Hot Springs, located 5 km northeast of the Strawberry Mountain wilderness, have a discharge of 250 liters per minute and a temperature of 58 ^{o}C. Limekiln Spring issues from the ground near the confluence of Indian and Overholt Creeks, flowing at a few liters per minute with a temperature of 21 ^{o}C. Another warm spring is located along Canyon Creek about 16 miles south of John Day, also flowing at a few liters per minute but has a warmer temperature of 39 ^{0}C. According to Thayer and others (1981), there is no substantial geothermal reservoir associated with these springs.

4.8.2.10 Wildlife

Composition of existing habitat for wildlife species in the LCM project area will generally shift from a more closed canopy habitat type to a more open canopy habitat type. Although closed canopy habitat types would be reduced, they would still be present in the project area. Some displacement or shift in use patterns by wildlife species would occur. However, it should be noted that immediately adjacent to the LCM project area is the Strawberry Mountain Wilderness, which is 68,700 acres in size. Wildlife species that would potentially be temporarily displaced would have an area approximately 30 times the size of the LCM project area to migrate to and carry on their life processes. The LCM project would increase habitat diversity in the area by providing a block of managed land that has a more characteristic/historical fire regime with several structural stages of forested habitat for wildlife species use.

4.8.2.11 Fisheries

The majority of summer steelhead spawning and rearing in Little Pine Creek occurs on private lands to the north of Bureau of Land Management (BLM) managed lands in the northeast portion of the project area.

4.8.3 Reasonably Forseeable Future Actions

4.8.3.1 Fuels

Although not documented, it is reasonable to assume that private landowners would continue to fireproof their own properties adjacent to the project area, and that logging operations would continue, also on private land.

4.8.3.2 Entomology

Some adjoining land managers may choose to treat overly dense stands of ponderosa pine in order to limit their vulnerability to bark beetles. The treatments may likely include thinning and possibly salvage of trees previously killed by bark beetles. These management actions would probably not have a bearing on the fate of stands within the Little Canyon Mountain planning area. An exception to that statement could arise if adjoining land managers choose to carry out thinning treatments and leave slash in their stands at the improper time of year (between January and June). Material left in the woods between January and June could provide habitat for pine engraver beetles which could subsequently increase in number and provide an additional threat to nearby stands in LCM once the emerging beetles fly from that material in search of new hosts to colonize.

4.8.3.3 Silvicultural Resources

The only ongoing forest resource management action within this LCM planning area has been firewood sales to private individuals. Material removed for firewood has been primarily insect killed pine and fir. This action is expected to continue as long as insect infestations continue. The future stand would vary randomly throughout the LCM area. Pockets of heavily infested and dead trees would eventually be gone to firewood cutting activities or the trees would eventually fall to the ground and add to the current fuel loads.

4.8.3.4 Visual Resources

Future management actions affecting visual resources are likely but unknown at this time.

4.8.3.5 Road Engineering and Transportation

The only use for the roads in the project area in the foreseeable future is by recreational users and by miners accessing their claims. There may be slight increases in recreational use but if the main road continues to deteriorate that use will decrease because of the increased difficulty of driving the road. At this time there is no mining activity other than at the Great Northern Mine and no increase is indicated in the future. However, if there was an increased demand for chromite ore there could be a substantial increase in the use of the road for hauling the ore. Prior to hauling the miner would be required to obtain a permit from the Bureau of Land Management. A permit from USDA – Forest Service would also be required if any Forest Service roads were used. The permit would require the miner to maintain the road to its current or better condition.

4.8.3.6 Recreation and OHV Use

OHV recreation has grown substantially in the last five years. Sales of new OHV's within Oregon have increased 150 percent; about 20 percent more than the national

increase. In 1997, Oregon had about 116,026 Class I and III ATV's, which is about 2 percent of the total quads and off road motorcycles in the United States. See Appendix I for information provided by the Motorcycle Industry Council regarding OHV sales in the U.S. and Oregon.

Knowing this, it is reasonable to expect that OHV use would continue to grow in the State of Oregon and therefore on public lands. BLM lands elsewhere in the Prineville District are seeing more and more use in the urban interface and close to housing subdivisions. It is likely that use would continue to grow in the Little Canyon Mountain area because of its close proximity to town. The areas around John Day and Canyon City have been used more heavily by OHV's (USDI BLM, 1984) and it is likely that this would continue because there are currently no similar, designated OHV opportunities in close proximity.

4.8.3.6.1 Recommendations For Future Actions

Under the LCM EA, limited actions can occur. When the John Day RMP is reviewed, further actions should be analyzed at that time. The following is a list of actions related to OHV's that should be considered then.

*Change land classification on Little Canyon Mountain from "open" to either "limited to existing" or "limited to designated." Limiting access to established routes could reduce many potential impacts from mineral entry and OHV use.

*Road closures. Consider closing/converting to other uses routes that do not access existing mineral claims. This could mitigate wildlife, water and fish issues and it puts BLM in control of future mineral access routes. For roads that are closed, consider obliteration (disguising, ripping, boulders, etc.). Gates invite vandalism and tank traps are negotiable by all classes of OHV's.

*Remove the pit from mineral entry. If the site is going to be for OHV use, mineral activities have potential conflict.

*Consider separate area for target practice. If the pit remains an OHV play area, there are potential safety hazards for OHV's with target practice going on. Maybe designate a specific target practice area.

*Re-open pit area to Class II OHV's. There are few Class II opportunities in Central Oregon. The pit is a good location, close to town, and in a site already disturbed by mineral entry. If more visitors are doing legal activities, it may discourage illegal dumping.

*Consider a more developed play area, perhaps something similar to the Rosland Recreation Site in LaPine, Oregon. As use demands, consider public health and safety issues – perhaps the need for a toilet and a more formal parking area.

*Consider a designated OHV trail system. The area offers excellent views, terrain and topography for OHV trail system. Consider 20-50 mile trail system with opportunities for all classes of OHV's. See appendix I, figure 5 for a suggested designated trail system layout See appendix J for COHVOPS (Combined Off-Highway Vehicle OPerationS) trail guidelines.

4.8.3.7 Mining and Minerals

Given the historic mining use, number of active claims, and likely presence of more gold lode and placer deposits, all of the LCM area will probably remain open to mineral entry in accordance with the 43 CFR 3809 regulations and mining laws to prevent unnecessary or undue degradation of public lands. The aforementioned presence of serpentine, chrysotile, nickel, platinum-group metals, and quartz and the potential interest in developing these minerals may have implications for management, land use, and ground disturbance. If produced in commercial quantities, all of these minerals would be primarily mined by the open-pit method though some platinum can be incidentally recovered from hydraulic gold mining.

4.9 Summary of Impacts

This assessment has analyzed the impacts from past, proposed and reasonably foreseeable future actions. The Little Canyon Mountain project area has be impacted by past mining activity since approximately 1862. This activity has disturbed roughly 50 percent of the project area. Mining still occurs in the area but to a much smaller extent than 60-100 years ago. The lack of active forest management coupled with active fire suppression has led to the build up of dangerous levels of wildfire fuels adjacent to homes and towns.

The primary Purpose and Need of this project is to reduce the risk of catastrophic fire to local homes and towns. The BLM has used crown fire potential as a surrogate measure of catastrophic fire potential. Each of the alternatives reduces crown fire potential to some degree as shown in Table 2.4. Alternative B, by virtually eliminating any ground disturbing activities during implementation of the proposed project, does the least to reduce crown fire potential.

Alternatives C through F each substantially reduce the threat of catastrophic fire to the local community. The implementation of these alternatives with the common design features substantially minimizes the effects to the environment from implementation of the proposed project. These alternatives would reduce the susceptibility of the stand to further insect infestations, Alternative E and F, which target dead and dying trees would also reduce the actual insect populations on the mountain and further reduce the threat of continued insect infestation. These alternatives are consistent with the visual resource guidelines as described within the John Day RMP of 1984, with the exception of Alternative D.

The primary concern for soils and hydrology are the ground disturbing activities proposed. Ground disturbing activities are limited in Alternatives C through F. Most of the area is

designated as aerially yarding only, which eliminates heavy equipment ground disturbance. The remaining areas are limited by a 20 percent disturbance area including existing roads and trails. Riparian buffers would further reduce any impacts to the stream. With these design criteria ground disturbance would not be substantial. Wildlife habitat within the project area would be altered from a dense overstory to a less dense overstory. The areas included in riparian buffers and the adjacent Strawberry Wilderness Area will still provide a substantial amount of dense overstory habitat in the area.

Road densities in the area are of concern to hydrology, soils, fisheries and wildlife resources particularly. Portions of the area have a high road density which decreases habitat cover for wildlife and increases the potential for erosion and sedimentation which effects soils, hydrology and fisheries. Alternatives D and E both address road concerns. Road improvements and closures would decrease the impact from roads to these resources.

The proposed project, when taken in the context of past impacts and foreseeable future actions, including the potential for severe catastrophic fire, minimizes and mitigates potential ground disturbing impacts through the project design criteria described in Chapter 2, and is not expected to created any substantial long-term effects beyond those described in the John Day RMP of 1984 or this supplemental assessment.

Chapter 5
No Impact Items

The following critical elements were considered, but will not be addressed because they would either not be affected or do not exist in the project are:

5.1 Agricultural Lands (prime or unique)
5.2 Areas of Critical Environmental Concern
5.3 Environmental Justice
5.4 Floodplains
5.5 Paleontological Resources
5.6 Wastes (hazardous or solid)
5.7 Wild and Scenic Rivers
5.8 Wilderness (including Wilderness Study Areas)
5.9 Special Status Plants

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Chapter 7
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Glossary of Terms

Active Crown Fire – Crown fires are created when a surface fire generates enough heat and energy to combust fuels above the surface, resulting in torching of individual or groups of trees. This causes erratic fire behavior with spotting and major fire runs. Direct attack from fire suppression forces becomes extremely dangerous. Crown fire is the highest intensity category and flame lengths are usually greater than 8 feet and can extend several hundred feet above the canopy. Wind and steep slopes can increase fireline intensity, initiating crown fire earlier (Agee, 1993).

Adit - any horizontal passage from the ground surface into a mine, i.e., a "tunnel." Technically, a tunnel differs from an adit in that a tunnel is open at both ends. For comparison, a shaft is a vertical passage into a mine.

Basal Area - the cross-sectional square footage area of wood fiber within a tree trunk that occupies a given space typically measured at breast height. Basal area per acre equals the sum of the basal areas of each individual tree.

Bituminous Surface Treatment - One or more applications of sprayed-on liquid asphalt followed by a layer of suitable aggregate to protect and preserve the surface, maintain the structural integrity or restore the surface texture and skid resistance of the roadway. Generally, BSTs are performed on low volume roadways.

Catastrophic - A level of insect or disease-caused tree mortality and/or damage, such that resource management goals and objectives are significantly hindered and desired future conditions described in Forest Plans cannot be achieved in either the short term or the long term (Schmitt and Scott, October, 1993).

Crown bulk density - the live foliage weight in pounds per square foot divided by the average live crown length. Crown-bulk density values above 0.006 lbs/ft^3 (where tree crowns touch and overlap) appear to sustain crown-to-crown fire spread, significantly increasing the potential for tree mortality and decreasing the ability of firefighters to safely fight the fire.

Severe summer weather conditions – The extreme weather conditions typically encountered in the summer for short periods of time (i.e. 90^{th} percentile conditions – weather conditions that are only exceeded 10 percent of the time; 97^{th} percentile – exceeded only 3 percent of the time). Values for 90^{th} and 97^{th} percentile weather conditions:

Variable	90th Percentile Conditions	97th Percentile Conditions
1 hr fuel moisture	3.0 %	2.3 %
10 hr fuel moisture	3.8 %	3.1 %
100 hr fuel moisture	6.1 %	5.1 %
1000 hr fuel moisture	8.4 %	7.5 %
Herbaceous fuel moisture	30 (recorded value is 18, but 30 is minimum for modeling)	30 (recorded value is 6, but 30 is minimum for modeling)
Woody fuel moisture	60 %	56 %
20 ft wind speed	12 mph	14 mph
Temperature	84ºf	88ºf
Relative humidity	17%	13%

Significantly – (as defined in 40 CFR 1508.27) – Significantly as used in NEPA requires considerations of both context and intensity:

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity. This refers to the severity of the impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming and action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Subsoil - The process of tilling and breaking up compacted soil layers using various kinds of tillage equipment.

Upper Management Zone - a level of tree stocking above which density-related tree mortality is likely to occur. The threshold basal area that constitutes the "Upper Management Zone" for the LCM stands is 100 square feet per acre, as determined from stand examinations that included measurements of the recent radial growth of co-dominant trees (Vidourek, 2002).

Wildland Urban Interface (WUI) - Two accepted definitions are:

1. the urban wildland interface community exists where humans and their development meet or intermix with wildland fuel.
2. the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel.

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